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# APPENDIX TO THE JOURNALS

OF THE

# SENATE AND ASSEMBLY

OF THE

TWENTY-FOURTH SESSION

OF THE

LEGISLATURE OF THE STATE OF CALIFORNIA.

Volume II.



SACRAMENTO:

STATE OFFICE : : : J. D. YOUNG, SUPT. STATE PRINTING.

1881.

Figure 1 consists of two scatter plots. The left plot shows a positive correlation between the number of children and the number of mothers, with a regression line indicating a positive slope. The right plot shows a negative correlation between the number of children and the number of mothers, with a regression line indicating a negative slope.

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REPORT

OF THE

BOARD OF EXAMINERS,

January 1, 1881.

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# REPORT.

BOARD OF EXAMINERS,  
SACRAMENTO, January 1, 1881. }

*To the Senate and Assembly of the State of California:*

In accordance with the requirements of law, the State Board of Examiners herewith submit their report on claims presented to them in pursuance of the provisions of Sections 664 to 667 of the Political Code.

The following claims are from contractors for work performed in the construction of the Napa State Asylum for the Insane:

Baker, Smith & Co.	\$5,050 00
Cox & Colley	2,388 43
Cox & Warren	2,015 18
Electrical Construction, for	766 15
Robert Ewing	5,328 10
Frear Stone Co.	1,165 76
Frear Stone Co. (for statuary)	4,487 00
Jas. Hunter & Co.	739 20
E. L. Mayberry	6,184 56
W. W. Montague & Co.	918 72
George J. Mothersole	189 68
Noble & Gallagher	2,941 57
W. F. Wilson	1,770 90
Wright & Sanders	936 00
Wright & Sanders (services as architects)	10,179 69
Total	\$45,060 94

Of this sum \$32,736 is claimed for interest.

The reasons assigned by each of these claimants are set forth in their respective statements, as follows:

"The Board of Trustees of the Asylum had no money on hand with which to pay this claim, but they had Controller's warrants, worth in the market less than ninety cents on the dollar. These warrants these claimants were compelled to take from said Board of Trustees in payment of their said claim against the State, so certified by the architect to be correct and due, but with the understanding with the Board of Trustees that the facts should be reported to the Legislature, and in the belief, on the part of these claimants and said Board, that when such facts were reported the Legislature would deal justly by these claimants. The warrants so received by these claimants were negotiated by them at their highest market value, which was less than ninety cents on the dollar.

"Their claim, therefore, is for interest on the amount due to them from — to the time they received said money, —, at ten per cent.

per annum, amounting to the sum of \$—, and interest on that amount to this date, at seven per cent. per annum, amounting to \$—.”

From the testimony elicited in the examination of these claims it appears that all these contracts were to be paid for in gold coin; that at the time warrants were issued the appropriation for the construction of the asylum was exhausted.

The Legislature of 1875-6 (see statutes 1875-6, page 804) passed an Act appropriating \$494,000 “for the payment of the valid and equitable claims against the State incurred in building the Napa State Asylum for the Insane, and to complete said structure,” etc.

Under this appropriation the aforesaid claimants expected to be paid the loss incurred by being compelled to dispose of their warrants at a discount. The Board of Trustees of the Asylum did not allow or pay these claims, not because of any invalidity therein, but for the more cogent reason that the building itself demanded the expenditure to prevent it from being ruined and to fit it for early occupancy; neither of which ends could have been accomplished had the appropriation been used for the liquidating of these demands of claimants. There is evidently some equities in favor of these claimants. An exhaustive report thereon was presented to the Legislature at its last session, by the retiring Board of Examiners. Without prejudice to these claimants these demands are again presented for your consideration.

The Frear Stone Company presents a claim for \$4,487, being the amount of principal and interest due on contract for statuary. This claim should be allowed for the sum of \$3,600. The architect issued his certificate for that amount, the Board of Trustees ordered the same to be paid; but, owing to lack of funds, the indebtedness was never canceled. It was claimed that the present Board of Trustees gave notice to the company that the work would not be received. This is denied by them and the fact that the statuary is in place in the building, and no record of notice of non-acceptance by the Trustees appears in the transactions of the Board is evident proof that it was accepted, and the contractors entitled to the terms of their contract.

P. J. O'Connor presents a claim for \$3,000, for services rendered as an expert in architecture. This claim was rejected by the last Board of Examiners for the reasons set forth in their report already cited. This Board declined to examine it on the ground “that they could not entertain for the second time, a demand against the State once rejected by it.” (See Section 670, Political Code).

Mr. O'Connor contends however, quoting the language of the section referred to, “unless such facts are presented to the Board as in suits between individuals, would furnish sufficient ground for granting a new trial;” and states in support thereof that Honorable Jo Hamilton, then Attorney-General and ex officio a member of the Board of Examiners, was disqualified from participating in any action on said claim because of his having acted as the Attorney for the Board of Trustees of the Napa Asylum for the Insane, and adversely to said claimant in an action began in the District Court of the Twelfth Judicial District, San Francisco, against the Trustees of the said Asylum, to recover the sum of \$10,000. The Board makes this statement simply as an act of justice to Mr. O'Connor, and has no opinion to offer, believing the matter beyond their jurisdiction.

Claim of W. F. Boardman, Sherman Day, and Grant I. Taggart for services as Commissioners, in the case of the People ex rel. vs. A. Pfeffer et al., to appraise the value of the springs and lands mentioned in "An Act to provide a supply of water for the University, and for the Asylum for the Deaf, Dumb, and Blind," approved April 1, 1876, in the sum of \$1,600.

The Legislature of 1875-6 passed the above entitled Act, having for its purpose the condemnation of certain lands within "a distance of one mile and a half from the extreme limits of the University grounds," in which were located certain springs and other sources of water supply, they having been declared necessary for the use of the institutions named in the title of the Act.

In lieu of a trial by jury to appraise and condemn said lands and water supply, the Act allowed the District Court to appoint three Commissioners or referees, "to appraise the value of said springs and lands, and the right of way to reach the same from the University grounds, over the lands between said springs and the grounds of the University." The Court appointed the claimants as Commissioners or referees, and ordered, adjudged, and decreed, that they be entitled to and awarded the sum of sixteen hundred dollars.

The appraisement was made and judgment rendered for the condemnation of said springs and lands, and the certificate of such facts presented to the Governor for his approval. He declined to do so on the ground that the appraisement and valuation was far in excess of the real value of the rights sought to be condemned. The claimants afterward petitioned the Supreme Court for a writ of mandate, compelling the Governor to approve the award of said Commissioners, but the Court refused to issue said mandate on the ground that it was discretionary with the Governor to approve or not. Before the definite settlement of the case the constitutional limitation interposed, and the appropriation lapsed. Hence the only method left for these Commissioners to present their claims was under Section 664 of the Political Code.

The Board is of the opinion that these Commissioners should be remunerated for their services, but the amount decreed by the Court they deem more than the actual services performed demand.

L. L. Lewis & Company presents a claim for thirty-eight dollars, for a patent ventilator chimney-top. This ventilator was placed in the Capitol, May, 1877. By an oversight the bill for the same was overlooked. The claimant is entitled to his demand, and the Board recommends its payment.

#### CLAIM OF ABBIE C. HARRISON, ADMINISTRATRIX OF THE ESTATE OF HAM. C. HARRISON, DECEASED.

Section 3696 of the Political Code, passed at the session of the Legislature held in 1871-2, provided that the State Board of Equalization "must determine the rate of the State tax to be levied and collected which, *after allowing for delinquency in the collection of taxes*, must be sufficient to raise the specific amount of revenue directed to be raised by the Legislature for State purposes."

The State Board accordingly, in September, 1872, levied the rate of State tax for the twenty-fourth fiscal year beginning July 1st, 1872, and ending June 30th, 1873. At the January term, 1874, the Supreme Court decided, in Houghton vs. Austin, 47 Cal. 646, that so much of

said section as gave the Board power to allow for delinquencies was a delegation to the Board of legislative power, and therefore unconstitutional. As this decision determined that the tax levied by the Board was void, many citizens refused to pay their taxes, not only for the twenty-fourth but for the succeeding twenty-fifth fiscal year.

At the session of 1873-4, the Legislature levied the taxes for the twenty-fourth and twenty-fifth fiscal years by an Act entitled "An Act levying a tax for State purposes, for the twenty-fourth and twenty-fifth fiscal years, and to provide for the enforcement thereof," approved March 28, 1874. (See Statutes 1873-4, page 746.) This Act provided, in section fourteen, "that the Controller must at once enforce the collection of taxes delinquent, either by civil actions, as such actions are prosecuted upon express contracts for the direct payment of money made are payable in this State, or by actions to enforce the lien of the assessment, as mortgage liens are enforced."

The Act also provided, in section twenty-one, that the State shall not be responsible to or pay any county officer for any services performed under this Act; but the fees for such services shall be taxed with the other costs in the action, and shall, when collected, be paid to the officers for their own use.

In pursuance of such law the Controller instituted suit against such persons as were delinquent, in the District Court of the Sixth Judicial District in and for the County of Sacramento, of which Court Ham. C. Harrison was the Clerk. So large a number of suits were begun that Mr. Harrison was forced to employ an additional clerical force, at his own cost. All of the cases had to be registered, and in each case a copy of the complaint had to be made, and summons issued. Many of the cases were pushed to judgment, but owing to the multiplicity of suits, at the beginning of the year 1876, a large number of the cases had not yet gone to judgment, though the attorneys for the people seemed to have used all diligence in the prosecution of the cases.

On March 15th, 1876, the Legislature passed an Act entitled "An Act to regulate proceedings for the collection of taxes," which provided "that in all cases when actions have been brought in the name of the State to recover taxes, under the provisions of the Act entitled 'An Act levying State taxes for the twenty-fourth and twenty-fifth fiscal years, approved March 28, 1874,' and the amount of tax sued for is ten dollars or less, the defendant in each of said actions shall be permitted to settle the same on the payment into Court of the amount sued for *without costs*."

The claimant alleges that if such law had not been passed, all of the actions then pending in the Court would have gone to judgment, and possibly in all the cases the taxes would have been collected, together with the costs due the Clerk, Ham. C. Harrison.

The fees taken in each case amount to \$11 90.

Since the passage of the Act of 1876 the said Ham. C. Harrison deceased, leaving a wife, Abbie C. Harrison, who is the claimant.

The above are the facts of the case. The claimant claims that as the State, by its action, took from the said Clerk the power to collect the costs, that the State should reimburse his widow for such loss.

There is much force in the claim of the claimant. It seems to the Board that when, by law, the State directed that suits should be begun, and provided how the costs should be paid, and when the

suits had been begun the State impliedly agreed that if the Clerk undertook such labor and performed his duty, that the State would use all diligence to push the cases to judgment and execution, so as to enable the Clerk to recover his costs. At the time of the passage of the law the major part of his work had been performed, and all that remained was to obtain judgment and to issue execution. But at this point the State steps in and says to the delinquent taxpayer: "We will be generous; we will forgive you the payment of the dues to the Clerk if you will pay the debt due the State." It seems to the Board that it does not lie in the mouth of the State to deny the equities of the claimant.

The Board deems it useless to recommend the amount that should be paid to the claimant, as the whole matter will doubtless be presented to the committees of the Legislature to which such matters are referred; but would recommend, as a saving of time, that an Act be passed making an appropriation for the payment of the claim, and directing that the claim be presented again to the Board for ascertainment of the number of suits on which the labor was performed and which were discontinued by the State, and also directing the Board to allow so much for each action.

In consideration of this claim, the Board calls your attention to a case now pending in the Courts of this State, in which the State has sued Ham. C. Harrison for the recovery of certain moneys, resulting in part from the receipts of money derived from these tax suits and kept by said Harrison. The State holds that the amounts so collected are the property of the State, and not of Mr. Harrison. If any appropriation be made by your honorable body to defray the costs of these tax suits claimed by Mr. Harrison, as County Clerk, would it not be as well to authorize the Board of Examiners, after investigation of these claims deserving compensation, to deduct the amount claimed by the State as decreed by any judgment which may be rendered by the Court having jurisdiction therein.

#### CLAIMS FOR DEFICIENCIES FOR PREVIOUS FISCAL YEARS.

The following claims are for deficiencies created during the thirty-first and thirty-second fiscal years. The appropriations made for these payments were not sufficient. They have been passed upon by the Board as properly entitled to payment and transmitted to the Controller, awaiting the action of the Legislature:

##### *Thirty-first Fiscal Year.*

For postage and expressage, Adjutant-General.....	\$10 06
For postage and expressage, Superintendent of Public Instruction.....	230 75
For rewards offered by the Governor.....	600 00
For postage and contingent expenses, Clerk Supreme Court.....	22 40
For armory rent and other expenses, National Guard.....	44 93
For stationery, lights, fuel, etc.....	1,548 14
For repairs of State Capitol building.....	318 38

##### *Thirty-second Fiscal Year.*

For repairs of State Capitol building.....	2,079 61
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The Legislature of 1877-8 (see Stat. 1877-8, page 97), appropriated the sum of \$9,448 to pay Registers and Receivers of the United States Land Offices, for procuring and listing lands to the State by the United States, for the twenty-fourth and twenty-fifth fiscal years.

This amount was not sufficient, there being due the Register and Receiver of the U. S. Land Office, Humboldt County \$794, and of Sacramento County \$597. As these claims have undergone strict examination, passed upon by the Surveyor-General and allowed by the Board, it is but just that the Legislature should authorize their payments, and the Board so recommends.

#### BONDS FOR SCHOOL FUND.

The Board of Examiners is required whenever, and as often as there is in the State treasury the sum of ten thousand dollars as proceeds of the sale of State school lands, the Board must invest the same in civil funded bonds of this State, or in bonds of the United States, at the lowest price at which they may be offered by the holders thereof. (Political Code, Sec. 680).

In pursuance of law, the Board advertised July 26, 1880, for the purchase of bonds to the extent of \$97,000, the amount in the State treasury to be thus invested. On the day set for opening bids there were but two bidders, as follows:

Sacramento County bonds, eight per cent. ....	\$121 30
United States four per cent. gold bonds, payable in 1907 .....	111 95
United States four per cent. gold bonds .....	112 11

These bids were rejected, the Board deeming the investment of but little value.

The Board is prohibited from paying more than the par value of any bonds offered for sale. This restriction renders it impossible to purchase advantageously, if indeed, any purchase can be made at all. It is an injustice to the School Fund, and should be remedied without delay. The power should be vested in the Board to purchase as freely as an individual—to permit them to go into the market on the same terms and with the same privileges as a private buyer. The experience of past administrations on this subject have been clearly expressed in their reports, and we add our appeal for the necessary change.

The Board respectfully invites the attention of your honorable body and requests that in the passage of laws, or in appropriations for traveling expenses for Boards, Commissioners, or individuals, that the character of such expenses be clearly defined. In auditing claims of this kind the Board is often embarrassed from the ambiguous expression of the law, what is really included in that term. Differences of opinion in the interpretation of the meaning of the phrase "traveling expenses," have arisen between the Board and claimants drawing appropriations under that title. The passage of an Act defining the intent of the Legislature thereon, would relieve the Board from an unpleasant duty.

The Act for the support of orphans, etc., passed at the last session of the Legislature, authorizes an examination to be made by the Board, either in person or by some trustworthy agent, as to the condition and management of the several orphan asylums of the State. The Board, on the twenty-fifth of October, 1880, appointed and authorized Mr. F. T. Morrelle to visit and report as to the management of the several orphan asylums receiving aid from the State, excepting those in the City of San Francisco, they having been inspected by the Clerk of the Board. The following is the report of our Agent:



To the honorable the State Board of Examiners, Sacramento, California:

In compliance with letter of appointment and instructions therewith, I beg leave to submit the following report on the management, condition, etc., of the Orphan Asylums:

#### INCREASE OF INMATES.

There has been admitted in excess of dismissals since January 1st, 1880 in the:

Grass Valley Orphan Asylum	44
Good Templars' Home for Orphans	36
San Francisco Roman Catholic Female Orphan Asylum	85
Mount St. Joseph's Orphan Asylum	44
Los Angeles Orphan Asylum	17
Los Angeles Home for Orphans	19
San Juan Orphan Asylum	6
San Francisco Protestant Orphan Asylum	
Ladies' Protection and Relief Society, San Francisco	
Ladies' Relief Society, Oakland	
Hebrew Orphan Asylum, San Francisco	
St. Boniface Asylum, San Francisco	
Sacramento Protestant Orphan Asylum	14
Total increase reported	265
Number of children in the asylums January 1st, 1880	2,289
Total number, December 1st, 1880	2,554
Total number drawing State aid for the year ending June 30th, 1880	2,160

The number of inmates in the asylums has constantly increased since 1877.

The increase of 1878 numbered	381 children.
The increase of 1879 numbered about	300 children.
The increase of 1880, to December 1st, numbered	265 children.

The amount of State aid contributed the twenty-eighth fiscal year	\$99,872
The amount of State aid contributed the twenty-ninth fiscal year	110,762
The amount of State aid contributed the thirtieth fiscal year	135,350
The amount of State aid contributed the thirty-first fiscal year	146,736

To account for this increase of children, the managers, independent of the past financial depression of business, assign two main causes that they consider lead to it, in explanation of which reference is here made to the joint report of the Senate and Assembly on Orphan Asylums at the last session. Therein it appears fully four fifths of all the children in the asylums are of foreign parentage.

First, it is stated the parents being in a foreign country, far from relatives and friends, are usually cramped in finances. When a case of whole orphanage occurs there is no recourse but these homes, and when half orphanage takes place the surviving parent, unable to provide sufficient support for their offspring, is also compelled to seek aid for a part, if not all the children, from the same source.

Secondly, with regard to abandoned children, intemperance and divorce are prolific causes, and so numerous are the applications for admission of this class that the asylums would be filled to overflowing, to the exclusion of orphans, were not the greater part of them denied; those only of extreme destitution, and where known to be worthy, being entertained, and some refuse them altogether. In reality this class is more to be pitied than the others, and the statute relating to the willful abandonment of children rigidly enforced would have a beneficial influence, and if defective should be amended.

#### HEALTH.

Within the asylums of this State, during the last eleven months, there has been sheltered an average of two thousand five hundred children; but few cases of illness occurred among them, and in all but eleven deaths.

With such a record comment upon their system of hygiene is superfluous. In all the asylums under the management of the Sisters of Charity and Mercy each child is provided with a separate towel and washbasin, a wise provision, to prevent the spread of cutaneous or ophthalmic diseases. The Committees on Hospitals and Asylums, upon visiting the San Francisco Protestant Home for Orphans, last Winter, observed ophthalmia to be prevalent among the children, and there are some cases among them at the present.

#### CLOTHING, ETC.

All appear to be cleanly and warmly clad, the dormitories well ventilated, the food sufficient in quantity and good in quality.

## COST OF MAINTENANCE.

By comparison a clearer idea of it may be attained. Superintendent Keating, of the San Francisco Almshouse, supplemented with the labor of the inmates on a large and productive farm, and the products of it devoted to the maintenance of the institution, reports the cost per capita at 22½ cents per diem. The cost per capita of the children of the orphan asylums varies from 20 to 26 cents per diem, in the necessities of life, according to the advantages possessed by them. Some managers estimate \$100 per capita per annum sufficient to maintain an orphan, including repairs and salaries of employes for educational and other purposes; but from the reports which will be forwarded January 1, 1880, under the provisions of the new law, a clear and concise statement of the cost per capita in each asylum can be computed. The San Francisco Almshouse has about reached the minimum in cost per capita. The asylums are on a par with it in maintenance, but in the latter attendants are required. These and educational expenses make the difference in the total cost per annum to each.

In asylums where other than orphans are maintained and educated, some minor differences in the cuisine exist, increasing slightly the expense. No distinctions, however, are made between the children; all are treated exactly the same, and the income derived from this class is expended for the general support. These pupils are charged \$10 per month without instruction in music, and \$15 with such instruction.

Apparently in those institutions where all the duties are performed by the Sisters of Charity or Mercy, *without compensation*, the expense should be less per capita than in the others; this is true to a limited extent, but the saving thus made is expended for the benefit of the orphans.

## EDUCATION.

A careful examination of the schools establishes the fact that they compare favorably with the public schools of the State, divided into primary, intermediate, and grammar. The class of books in use is the same as in the public schools, with the exception of Sadlier's readers and geography, which supplement the others in some cases. Facilities are afforded for instruction in the higher branches and music in the Grass Valley, Petaluma, Santa Barbara, Los Angeles, Santa Cruz, and San Francisco Roman Catholic Female Orphan Asylums to those who pay for the same. No orphan, however, who evinces the desire and possesses the ability to acquire proficiency therein is debarred from instruction in such course, and to-day some are occupying positions as teachers with success.

## RECREATION GROUNDS.

In the cities these are necessarily limited, and generally are not sufficiently extensive to give the children freedom of exercise. At San Rafael an additional yard has been fenced, wherein the Superintendent, Rev. Jas. Croke, informs me, the boys are to be instructed in military drill. He is also erecting a large gymnasium for their use. Twice a week the boys are allowed to go outside the yards to play on the flat near by. Probably they are granted all the privileges possible, as it appears they are inclined to run away. The windows are all barred, and the fences so constructed that a boy cannot get over them. These precautions give the place a prison-like appearance. The strictest discipline is enforced, and the teachers, who also act as attendants, are with the children night and day.

## MORAL TRAINING.

Veneration for truth, honesty, industry, order, politeness, and habits of economy are taught by precept and example.

## CONTRIBUTIONS FROM CHILDREN'S RELATIONS.

The support derived from this source is very small, though at the time of the admission of the children to the asylums the parent or relations agree to pay a small sum monthly. After a few payments, in most cases, they cease altogether, and frequently neglect to pay anything. No suggestion has been offered by the managements whereby those who are able and do not may be forced to contribute.

It does not appear that the bounty of the State is or can be abused, except in this regard. However, if failure to contribute should cause the relative or guardian to lose control of the child, and the guardianship to be invested in the officers of the asylums, it might work a salutary change in this respect.

## CENSUS OF CHILDREN FOR SCHOOL PURPOSES.

Section 1658 of the school law reads, regarding the School Marshal: "He must not include in his report children who are attending institutions of learning, or such benevolent institutions as deaf and dumb and blind and orphan asylums in his district, but whose parents or guardians do not reside therein." As several of the asylums have placed their children under the Educational Board of the district in which they are located, it has been suggested this section of the school law should be revised.

## GENERAL REMARKS.

The management of these institutions is excellent throughout, and beyond doubt the children are better cared for morally, intellectually, and physically, than they would have been in many instances in the homes of their parents. It is said no child who has been an inmate of these institutions, from six to fourteen years of age, has ever been incarcerated in San Quentin. If this be true, this alone would be a satisfactory return for the aid of the State. It has been supposed by some, these asylums are money-making institutions. Most of them barely succeed with State aid, and, with the exception of the Hebrew Asylum, are to some extent in debt—Los Angeles Asylum, \$72,000; Santa Barbara, \$54,000; Santa Cruz, \$8,000; Grass Valley, \$5,000, etc. It takes the greatest economy, coupled with donations and the aid of the State, to meet their requirements. Any one who examines them carefully must conclude the charity of the State is worthily bestowed, aiding to save thousands of children from destitution and crime. It is represented the most dangerous period for these children is from fourteen to twenty years of age. A law providing for their supervision by the officers of the asylums at that time, and also the agreements of those taking children from the asylums, would greatly benefit them, as in many cases they are not properly provided for, and are badly treated.

All of which is respectfully submitted.

F. T. MORRELLE,  
Inspector of Orphan Asylums by appointment.

Having visited the Orphan Asylums of San Francisco and Oakland, I fully concur in the statement made by Mr. Morrelle.

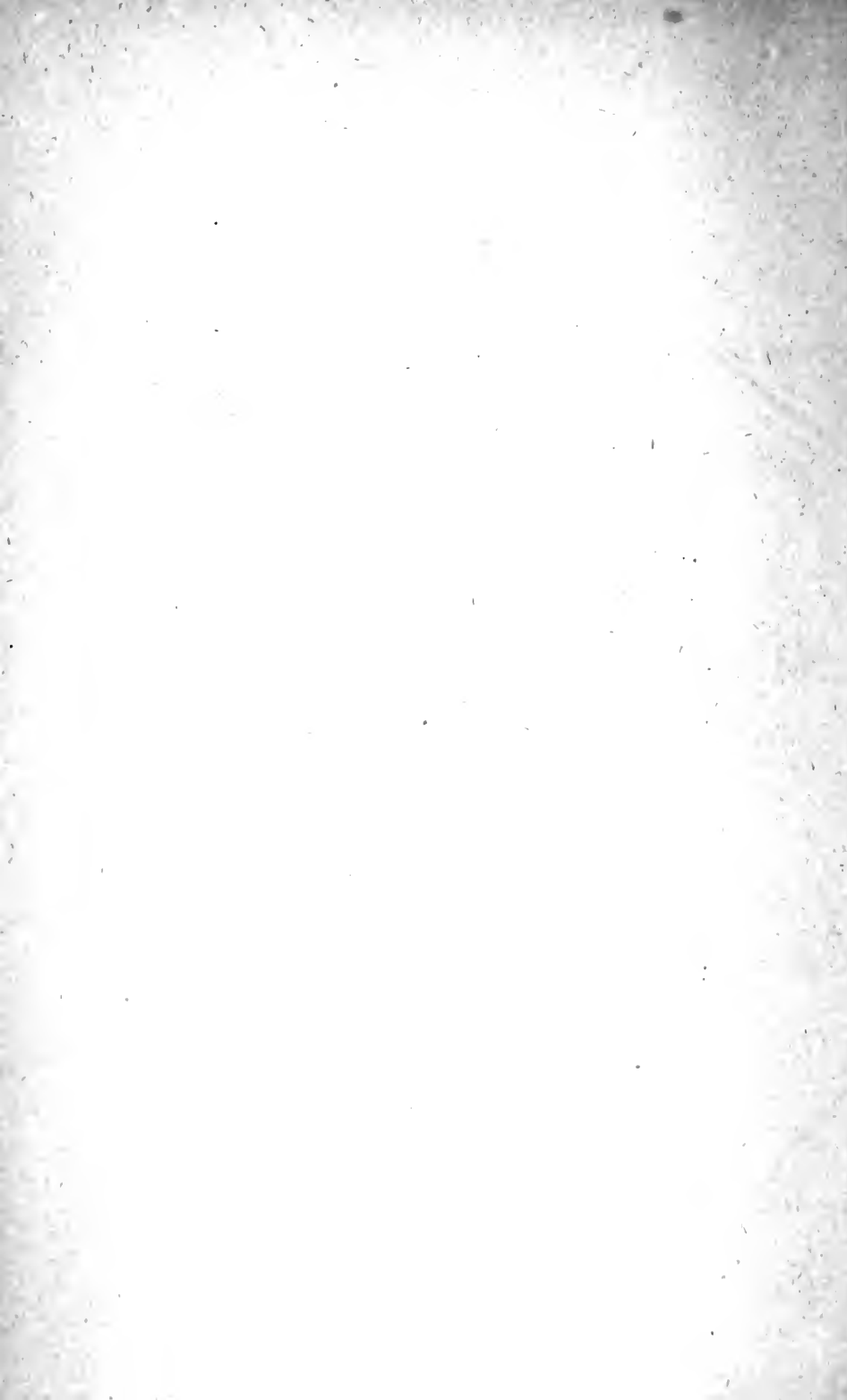
A. HART,  
Clerk Board of Examiners.

## SALARY OF THE CLERK OF THE BOARD.

In the reduction of salaries made at the last session of the Legislature, the salary of the Clerk of the Board of Examiners was reduced from \$100 per month to \$50. It is not a sufficient remuneration for the onerous labors devolving upon him. The position is one of great responsibility and trust. Every claim against the State must pass through his hands before presentation to the Board, and to a proper fulfillment of his duties it is necessary he should be thoroughly conversant with all laws bearing on the claims presented, and in numberless instances, careful judgment and judicious discretion are required on his part in the proper adjustment of such claims.

An inspection of the books of the Board will convince your honorable body of the justice of this restoration.

GEORGE C. PERKINS, Governor,  
D. M. BURNS, Secretary of State,  
A. L. HART, Attorney-General,  
Board of Examiners.



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# REPORT

OF THE

# SECRETARY OF STATE,

FROM

January 5, 1880, to July 1, 1880.

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# REPORT.

DEPARTMENT OF STATE,  
SACRAMENTO, July 1st, 1880. }

SIR: I have the honor to submit the following report of the operations of this department during the past six months, together with such suggestions as my experience has convinced me will promote the efficiency of the public service.

## RECEIPTS.

Fees for month of January, 1880, including amount received from Hon. Thos. Beck-----	\$1,176 50	
Fees received during the month of February, 1880-----	681 40	
Fees received during the month of March, 1880-----	589 75	
Fees received during the month of April, 1880-----	762 50	
Fees received during the month of May, 1880-----	547 50	
Fees received during the month of June, 1880-----	599 50	
Total amount-----		\$4,357 15
Amount received from sale of California Reports-----	\$341 50	
Amount received from sale of ballot paper-----	167 00	
		\$508 50
Total receipts-----		\$4,865 65

## DISBURSEMENTS.

January 31st, 1880, paid into the State Treasury-----	\$1,176 50	
March 2d, 1880, paid into the State Treasury-----	720 40	
April 2d, 1880, paid into the State Treasury-----	756 75	
May 3d, 1880, paid into the State Treasury-----	1,065 00	
June 7th, 1880, paid into the State Treasury-----	547 50	
July 1st, 1880, paid into the State Treasury-----	599 50	
		\$4,865 65

The receipts above mentioned were for the following services, viz.:

For filing and recording 158 articles of incorporation, and issuing certificates thereon-----	\$1,540 50	
For issuing 339 commissions to Notaries-----	1,695 00	
For issuing 19 commissions to Commissioners of Deeds-----	95 00	
For recording 62 trade marks-----	186 00	
For certificates of official character, certified copies, attesting warrants of arrests, land patents, miscellaneous business, etc-----	1,349 15	
Total-----		\$4,865 65

## SUPREME COURT REPORTS.

Number of volumes received from Hon. Thomas Beck-----	5,518	
Number of volumes received from Bancroft & Co-----	300	
		5,818
Volumes distributed-----	288	
Volumes sold-----	121	
		409
Volumes on hand, July 1st, 1880-----		5,409

## STATE GEOLOGICAL SURVEY.

Number of volumes received from Hon. Thomas Beck.....	93
Distributed upon orders from the Executive Department.....	30
Volumes on hand, July 1st, 1880.....	63

## BALLOT PAPER.

Number of reams on hand, January 5th, 1880.....	621 6-10
Number of reams sold.....	49 1-10
Number of reams on hand.....	572½

## POSTAGE, EXPRESSAGE, TELEGRAPH, ETC.

Amount unexpended January 5th, 1880 .....	\$1,222 04
Paid for postage stamps.....	\$670 09
Paid for telegraphing.....	204 61
Paid for expressage.....	347 34
Total.....	\$1,222 04

## STATIONERY, LIGHTS, FUEL, ETC., FUND.

The unexpended balance in this fund, January 5th, 1880, was inadequate to meet the demands accruing against it, and it became exhausted ere the close of the fiscal year. The consumption of gas cost, \$4,577 70; wood, \$2,298 79.

I herewith append a statement showing the sums allowed, and the deficiencies against said fund:

Paid for gas.....	\$3,198 60
Paid for coal.....	463 81
Paid for wood and kindling .....	1,300 18
Paid for stationery, etc.....	5,458 63
	\$10,421 22

## APPROPRIATION.

January 5th, 1880, unexpended balance.....	\$10,421 22
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## DEFICIENCIES.

Unpaid wood bills.....	\$998 61
Unpaid gas bills.....	1,379 10
Unpaid stationery, etc., bills.....	246 48
Total deficiency.....	\$2,624 19

## STATIONERY ACCOUNT.

I have delivered, upon requisitions duly signed, to the various State officers, members of the Legislature, and others entitled by law thereto, stationery as follows:

State officers.....	\$3,438 15
Members of the Senate, officers, and committees.....	1,724 92
Members of the Assembly, officers, and committees.....	1,931 08
Total.....	\$7,094 15

## CONTINGENT FUND.

January 5th, 1880, there was an unexpended balance of \$23 50 in this fund, which has been expended in the purchase of ice, towels, etc., and newspapers for the use of this department.



## REPAIRS TO ROOF OF STATE LIBRARY.

The last Legislature appropriated \$1,000 for repairs to the roof of the State Library. I contracted with Messrs. Whittier & Fuller for the removal of the glass from the skylight and the replacement thereof with much heavier glass, and covering the same with a wire netting, which effectually prevents the breaking of the glass by rocks or brick-bats, as heretofore. The entire cost of the repairs, including the tinner's bill, was \$966 70, leaving an unexpended balance of \$33 30.

## STATE SEALER OF WEIGHTS AND MEASURES.

As ex officio State Sealer of Weights and Measures, I have the honor to report to your Excellency that I have neither sealed, weighed, nor measured. The office is apparently one of honor, entirely void of duties. A repeal of the law would eliminate from our statutes a cumbersome and useless Act.

## STATE CAPITOL.

As Superintendent of the State Capitol building, I have endeavored, so far as the limited appropriation would admit, to keep the same, and the large amount of property therein, in good order. The funds at my disposal have not been sufficient to place the building in the condition that the public anticipates. The Senate and Assembly Chambers, and the rooms contiguous thereto, are sadly in need of repairs. The walls thereof need whitening or kalsomining; the desks and furniture should have a thorough overhauling, and the windows and doors should be painted. Many of the offices are in the same condition, and deservedly need attention. It has been some years since the inside of the building has been painted; if I am correctly informed, it has received no attention in that respect since its completion. In my judgment it would be true economy, and money well expended, for the Legislature to make the necessary appropriation to carry out the suggestions I have offered. In the care and management of the building I have been ably assisted by the Janitor, Mr. E. L. Craft, and his corps of assistants; they each deserve commendation for the faithful manner in which they have cared for and guarded the property of the State.

In consequence of the malicious disposition of some visitors, the walls of the building have been badly mutilated and defaced by writing and carving thereon a class of literature unknown to our *alma mater*. Therefore, I ordered the door leading to the dome of the building to be kept locked, and none admitted thereto unless they presented a permit. Since the adoption of the above procedure the mutilations have ceased.

I would call the attention of your Excellency to the fact that there are no plans of the Capitol building in existence, they having been destroyed, as I am informed, at the time of the burning of the architect's residence, some years ago. While it is not essential that we should have plans of the general structure, yet it is very necessary for the Superintendent to have tracings of the various steam, gas, and water pipes; much time is lost in endeavors to find leaks and breaks in the pipes, which would be obviated materially by a knowledge of their location. It would cost but a small amount to

have proper plans prepared; they could then be recorded in a book in the Secretary of State's office, and become a ready reference for all future time.

#### WATER.

The State pays six hundred dollars per annum for water used in the building, and about twelve hundred dollars per annum for water for irrigating purposes. I am convinced that a well could be sunk for one thousand dollars which would afford ample supply for the building, and for irrigation, and of a quality as good as that now furnished. For a sample, I would refer to the well located on K, between Tenth and Eleventh streets, in the building where the Natatorium is located. The supply is ample, quality good, and entirely free from debris. We now are compelled to pump the water used in the building from the mains into tanks situated in the attic. The same power would lift the water from the well. The only additional expense, after the completion of the well, would be the erection of tanks, and pumping the water into them for irrigation purposes. We now have an engine, pump, engineer, and fireman, and no additional expense would entail except for firewood. I recommend a consideration of this subject.

#### ELEVATOR.

I recommend an appropriation for the purpose of placing an elevator in the State Capitol building. It would be a very great convenience, not alone to the officers connected with the building, but to the public having business with any of the departments located on the upper floors. It would enable those having charge of the building to more completely control the visitations to the dome, for the elevator would land them in the attic, and all other means of ingress thereto could be closed. During the sessions of the Legislature, the committees are in need of more rooms for the transaction of their business than the building now affords. If an elevator was placed therein, several committee rooms could be constructed on the fourth floor. Business would thereby be facilitated, and comfort assured. The construction of an elevator in the building would not in any way interfere with the structure. The entire cost thereof would not exceed \$5,000.

#### SECRETARY OF STATE'S OFFICE.

Upon assuming the duties of the office of Secretary of State, I found the work of the office somewhat incomplete. The recording of articles of incorporation was behind more than a year, and in other respects the work was not completed. As the duties of my office kept the clerks thereof fully employed, I was unable to do such unfinished work without permitting the business of my term to run behind. I therefore employed a competent clerk, and he is now engaged in writing up said work. As there are no funds available for that purpose, I would ask that the Legislature appropriate an amount sufficient to cover the expense thereof.

The clerks in my office are faithful and attentive. Their record-books are models of neatness, and the work is kept close up. I am exceedingly gratified with the business qualities exhibited by them, and am content with the thought that they desire to do their whole duty.

Your official acts as Governor have been duly attested, and a correct record kept of the same, and all the business of the office properly registered, as by law required.

STATE OF CALIFORNIA, }  
County of Sacramento, } ss.

D. M. Burns, Secretary of State of the State of California, being duly sworn, on his oath says that the foregoing report contains a detailed account of all his official actions as Secretary of State (except of such as relate to his ex officio duties), from January 5, 1880, up to the 1st day of July, 1880, and particularly a detailed statement of the manner in which all appropriations for his office have been expended, to the best of his knowledge and belief.

D. M. BURNS.

Subscribed and sworn to before me, this 1st day of October, A. D. 1880.

FRANK W. GROSS,  
Clerk Supreme Court.

[SEAL.]

Respectfully submitted.

D. M. BURNS,  
Secretary of State.

*To his Excellency, GEORGE C. PERKINS,*  
*Governor of the State of California.*



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FIRST REPORT

OF THE

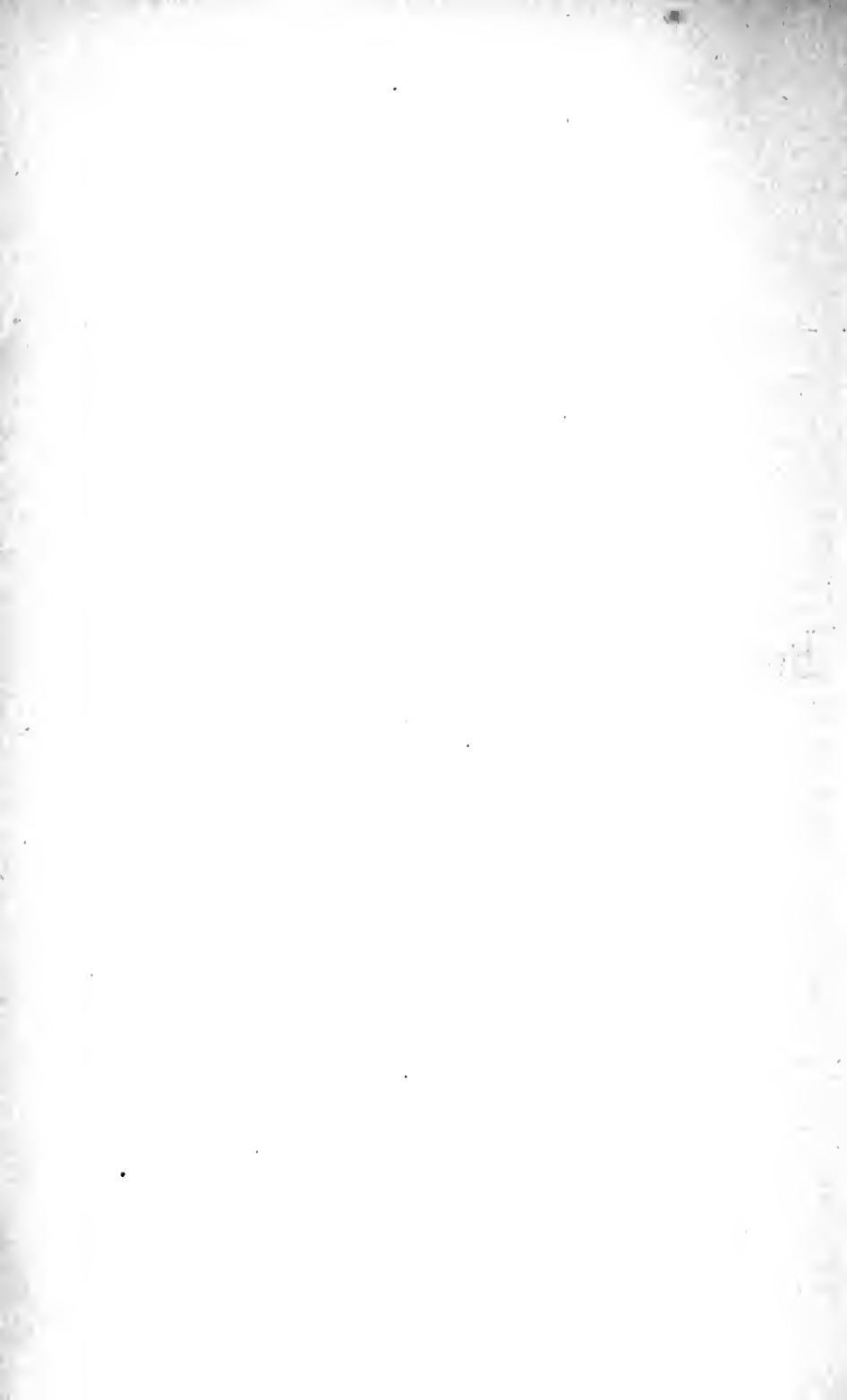
Board of Railroad Commissioners

FOR

1880-81.

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# REPORT.

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OFFICE OF THE BOARD OF RAILROAD COMMISSIONERS )  
OF THE STATE OF CALIFORNIA, )  
SAN FRANCISCO, February 4, 1881. }

*To his Excellency* GEORGE C. PERKINS, *Governor:*

SIR: We respectfully submit the following as our first report. A more elaborate and detailed account of our work is rendered impossible for the present, by reason of illness, resulting from attempted assassination on the night of December 12, 1880, of one of the Commissioners, causing an unavoidable delay in action upon important business before the Board, and, as a necessary consequence, limiting the amount of work done.

The powers granted this Board are extraordinary in range and novel in composition. The Constitution divides the State Government into three coördinate departments: the Legislative, Executive, and Judicial, and inhibits persons charged with the exercise of powers belonging to one of these departments from the exercise of any functions appertaining to either of the others, thus dividing the powers, duties, and responsibilities. The Railroad Commission is made an exception in this general apportionment of the powers and obligations of government, neither constituted so as to belong to nor be under the direct control of either of the enumerated departments, yet granted powers in their nature appertaining to all three. Vested with the power of originating arbitrary rates for carriage of passengers and freight; the power to establish tariffs, based on such rates, and the power to determine infractions, and cause punishment for violations of orders; with a jurisdiction thus extended, it is not a matter of surprise to encounter, from certain quarters, a clamor for hasty, inconsiderate action; a biased demand for execution of authority at random.

Were it compatible with an honorable and intelligent discharge of our official duties to, at random, fix rates of charges for transportation, the duties of the Board would be the opposite of onerous; but reason and justice alike dictate that the actions of this Board be governed by a desire to do right. That its decisions be the result of investigation, and a thorough understanding of the subjects passed upon. Caprice and prejudice will but confound, never solve, the transportation problem. The acquirement of the knowledge necessary for rational action in a matter so complex and intricate, is not the labor of an hour or a day, or any fixed period; comes not by intuition, but only through patient investigation and study. The State, in assuming the supervision and control of railroads and other

methods of transportation, when the property of private persons or corporations, does so under the plea of necessary regulation. To sustain this plea, and not transcend its scope, State interference under it must not become confiscation and spoliation, but limit itself to what, on investigation, appears as just and reasonable regulations. The difficulties attending a just and efficient administration of our office need but mention to be appreciated. Our office and its duties is new. We are without precedent to guide us. Sister States and foreign countries have labored for years to solve the railroad problem, and to this day their actions have been experimental. While the efforts of others, for a period of over forty years, are valuable aids, they are far from infallible guides. The transportation problem in each State and country is a matter peculiar to that State and country. In the exercise of its authority, the Board must assume control over property whose ownership is private; the employment of private property in the various methods of transporting passengers and freights does not of itself divest private ownership in the thing so employed, and thereby constitute it public property. An erroneous idea prevails to quite an extent, that railroads built, owned, and operated by private corporations are nevertheless public property, and this in an unqualified sense.

Were this true, we would be free of the main difficulties surrounding our work. However much theorists may claim, and loose constructionists argue, the fact remains, that railroads owned and operated by private corporations, are private property, and this, though subject to State supervision and control. Among the number of circumstances to be considered in determining the status of railroad ownership in this State, but one needs mention. Does the property in railroads in this State pay taxes to the State, etc.? Does property owned by the State pay taxes? To whom is the property in railroads assessed? There cannot be a correct understanding of the onerous position this Board occupies until the idea that the railroads constituted in California are public property, is thrown aside as false. Were the railroads in this State public property, our duties would be most easy and pleasant. It would be the case of management of property by its owner. Whereas, under existing circumstances, it is the management of the property of others. An unprejudiced admission of the true condition of affairs in this connection can in nowise jeopardize, or even in the slightest curtail, the right of the State to change existing property right in and to the railroads, and to make them public property; but this change has not been effected, and therefore is not the reason of the present supervision and control.

The Hon. J. S. Black, in a letter to the Committee on Railroad Transportation of the New York Chamber of Commerce, dated November 16, 1880, uses the following language:

Most of our Western roads were built with the proceeds of public lands, granted mediately or immediately by the United States, to the several companies which now have them in charge. They did not really cost the stockholders anything; and in some cases they got lands worth a great deal more than all expenses of making, stocking, and running the roads. \* \* \* Nevertheless, I think the claims of these companies to take reasonable tolls, stands upon the same foundation as that of companies whose roads were built by the stockholders themselves, at their own proper expense. \* \* \* That is to say, those companies which built the railroads with capital donated by the public, have the same right as other companies to charge a reasonable toll; but their demands of excessive tolls, though not worse in law, seems in the eye of natural reason, a great outrage. If railroad companies possess the right to charge a reasonable toll, and to appropriate its benefits to themselves, whence this right, if not as an incident of existing ownership?



A proper discharge of our duties demands that the rates which we may adopt and establish from time to time be just and reasonable. What is a just and reasonable rate depends on the service to be performed. A rate, to be just and reasonable, must be so to all parties interested in the transportation. We cannot herein, for reasons already stated, enter into a review, at this time, of what goes to make up the cost of transportation, and in what proportion this expense should be apportioned among the different commodities carried, nor what, in our opinion, will constitute a just and reasonable return to the carrier. These matters will be fully considered and our conclusions made public in another report to follow this as soon as attendant circumstances permit. Although, in common with the other State officers, we entered office in January, 1880, an organization of this Board could not take place, for want of necessary legislation, until May 3, 1880. The Act providing for the organization having become a law on April fifteenth, on May third the Commissioners met in San Francisco and organized as a Board. J. S. Cone, Commissioner from the First District, was elected President; W. R. Andrus, Secretary; and F. V. Steinman, Bailiff. The Board proceeded at once to business. The Secretary was instructed to notify the several transportation companies to at once file in the office of this Board schedules of their fares and freights, as in force December 31, 1879, and January 1, 1880, stating the changes, if any, at time of filing. The companies, with one or two exceptions, complied as soon as circumstances permitted. The Pacific Coast Steamship Company refused to recognize the authority of the Board, and commenced suit in the United States Circuit Court to restrain the Board from in any way interfering with the business of the company. Proper steps have been taken, by the employment of counsel, etc., to defend said action. Copies of the pleadings in the case will be found in the Appendix hereto.

To give persons residing at a distance from the office of the Board, and who had complaints against the transportation companies, an opportunity to make the same to us in person, and also to inform ourselves by personal inspection of the condition of the roadbed, rolling stock, etc., of the several railroads of this State, and the accommodations and facilities given the traveling and shipping public by the transportation companies, we visited the following places in the order named, viz.:

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Colton.....	San Bernardino County.	Marysville.....	Yuba County.
San Gabriel.....	Los Angeles County.	Chico.....	Butte County.
Los Angeles.....	Los Angeles County.	Red Bluff.....	Tehama County.
Wilmington.....	Los Angeles County.	Redding.....	Shasta County.
Anaheim.....	Los Angeles County.	Sacramento.....	Sacramento County.
Santa Monica.....	Los Angeles County.	Auburn.....	Placer County.
Redwood City.....	San Mateo County.	Truckee.....	Nevada County.
San José.....	Santa Clara County.	Colfax.....	Placer County.
Hollister.....	San Benito County.	Nevada City.....	Nevada County.
Monterey.....	Monterey County.	Stockton.....	San Joaquin County.
Santa Cruz.....	Santa Clara County.	Modesto.....	Stanislaus County.
San Rafael and Tamales.....	Marin County.	Merced.....	Merced County.
Petaluma.....	Sonoma County.	Fresno.....	Fresno County.
Cloverdale.....	Sonoma County.	Visalia.....	Tulare County.
Gurneville.....	Sonoma County.	Bakersfield.....	Kern County.
Santa Rosa.....	Sonoma County.		

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In visiting the places named we have traveled over 3,208 miles. Due notice was given of the time and place of holding our sessions, which were held in every instance in the most convenient place attainable to accommodate the public; the utmost latitude permissible was accorded to persons appearing before the Board. Oral statements were received and phonographically taken by the Stenographer of the Board, and by him written out in longhand and filed in our office for reference. Justice was thus brought practically to every man's door, and all believing themselves aggrieved given an opportunity to make manifest their inquiry and secure redress. Most of the complaints were oral, and general, and not under oath. In every case where the Board has believed merit to exist, it has notified the company concerned, so as to have the wrong, if found to exist, remedied. The Board has found a cheerful willingness on the part of the several transportation companies to correct any irregularities as soon as found to exist, and a notification. Fourteen specific complaints were made to us; copies of which, together with copies of answers thereto, as received, are published herewith, as the Board considers them of value as illustrating the general nature of the complaints as made. We have, on divers occasions, propounded questions upon subjects pertaining to a solution of the transportation problem in this State to the several transportation companies, and have received prompt answers. We have lately caused to be served on the several railroad companies, carefully prepared questions in relation to their whole business as carriers. The answers, when received, which will be soon, will materially aid us in our labors, and in the work now occupying our attention—the fixing of just and reasonable rates for the transportation of passengers and freights. We call attention in this connection to the letter of A. N. Towne, General Superintendent of the Central Pacific Railroad, dated January 5, 1881, appearing in our Appendix, as showing the labor necessary to answer but a few seemingly easy questions relative to the business of said railroad, and how necessarily this work increases when the questions amount to hundreds. We have labored assiduously since the time of our organization—nine months ago—to procure the necessary material to enable us to act understandingly and justly, and have succeeded to such an extent that we confidently hope and expect to make the benefits resulting from the creation of this Commission felt throughout the State very soon—to thorough justice—the execution of which can work harm to no man, bring about an era of good will between all interests concerned in the transportation question. In our inspection of the railroads we have found the standard gauge roads to be in first class condition, both as to roadbed and equipment. Whenever rails have become worn they have been replaced by first class steel rails. The narrow gauge roads, as a rule, are in equally good condition, though in some portions of some of the older narrow gauge roads, new rails should at once be substituted for the old and badly worn rails now used. The passenger and freight stations, and warehouse accommodations throughout the State, on all roads, as a rule, are good and ample. When the exception appears, we have the assurance that changes will at once take place.

This State contains at present 1,937.76 miles of standard gauge railroad, and 273.79 miles of narrow gauge railroad. There are 661

stations on the railroads of this State, where passengers and freight are received and discharged, distributed among the roads as follows:

Central Pacific Railroad (passenger stations only).....	289
Southern Pacific Railroad.....	102
South Pacific Coast Railroad.....	38
Visalia Railroad.....	3
Santa Cruz Railroad.....	20
S. L. A. and S. M. Valley Railroad.....	8
North Pacific Coast Railroad.....	91
Vaca Valley Railroad.....	19
Nevada County Railroad.....	17
S. F. and North Pacific Railroad.....	74
Total stations.....	661

The tariffs of the several transportation companies (except the P. C. S. S. Company) are on file in our office.

A general reduction in freight charges has taken place on the Central Pacific Railroad and leased lines, in this State, during our term of office. We give a brief synopsis of the reduction, to illustrate its general character:

#### RATES ON GRAIN.

STATIONS.	FREIGHT PER TON.		
	Was.	Is.	Reduction— Per Ct.
<i>To San Francisco—From:</i>			
Red Bluff.....	\$6 00	\$5 50	17
Chico.....	5 35	4 40	18
Marysville.....	3 25	3 25	—
Roseville Junction.....	3 80	2 90	24
Merced.....	4 20	3 50	17
Goshen.....	6 00	5 50	8
Sumner.....	6 00	5 50	8
<i>To Port Costa—From:</i>			
Red Bluff.....	9 20	4 50	51
Chico.....	7 60	3 90	49
Marysville.....	5 80	2 75	51
Sacramento.....	3 20	2 25	30
Stockton.....	2 80	1 72	39
Lathrop.....	2 60	1 70	35
Modesto.....	4 60	2 35	49
Merced.....	8 60	3 00	65
Fresno.....	13 80	4 35	68
Goshen.....	17 00	5 00	70
Sumner.....	21 50	5 00	76
Mojave.....	22 80	5 00	76
Los Angeles.....	9 10	5 50	40
San José.....	4 00	2 45	39
<i>To Stockton—From:</i>			
Merced.....	3 05	2 35	23
Fresno.....	3 85	3 70	4
Goshen.....	4 85	4 35	10
Sumner.....	4 85	4 35	10
Mojave.....	4 85	4 35	10
Spadra.....	7 30	6 00	18

## RATES ON WOOL.

STATIONS.	PER HUNDRED POUNDS.		
	Was.	Is.	Reduction— Per Ct.
<i>To San Francisco—From:</i>			
Red Bluff .....	\$1 05	\$ 87	16
Chico .....	67	52	22
Marysville .....	45	39	13
Roseville Junction .....	39	39	—
Merced .....	64	48	24
Goshen .....	93	60	35
Sumner .....	1 17	60	49
<i>To Stockton—From:</i>			
Red Bluff .....	99	87	11
Chico .....	67	52	22
Sacramento .....	22	22	—
Merced .....	49	36	26
Fresno .....	59	45	23
Goshen .....	78	48	38
Sumner .....	1 02	50	51
Mojave .....	1 12	50	55
Spadra .....	72	65	9
<i>To Sacramento—From:</i>			
Red Bluff .....	90	75	17
Merced .....	65	48	26
Fresno .....	75	57	24
Goshen .....	94	60	31
Sumner .....	1 18	60	49

J. S. CONE,

Railroad Commissioner, First District.

C. J. BEERSTECHEER,

Railroad Commissioner, Second District.

— — — — —,

Railroad Commissioner, Third District.

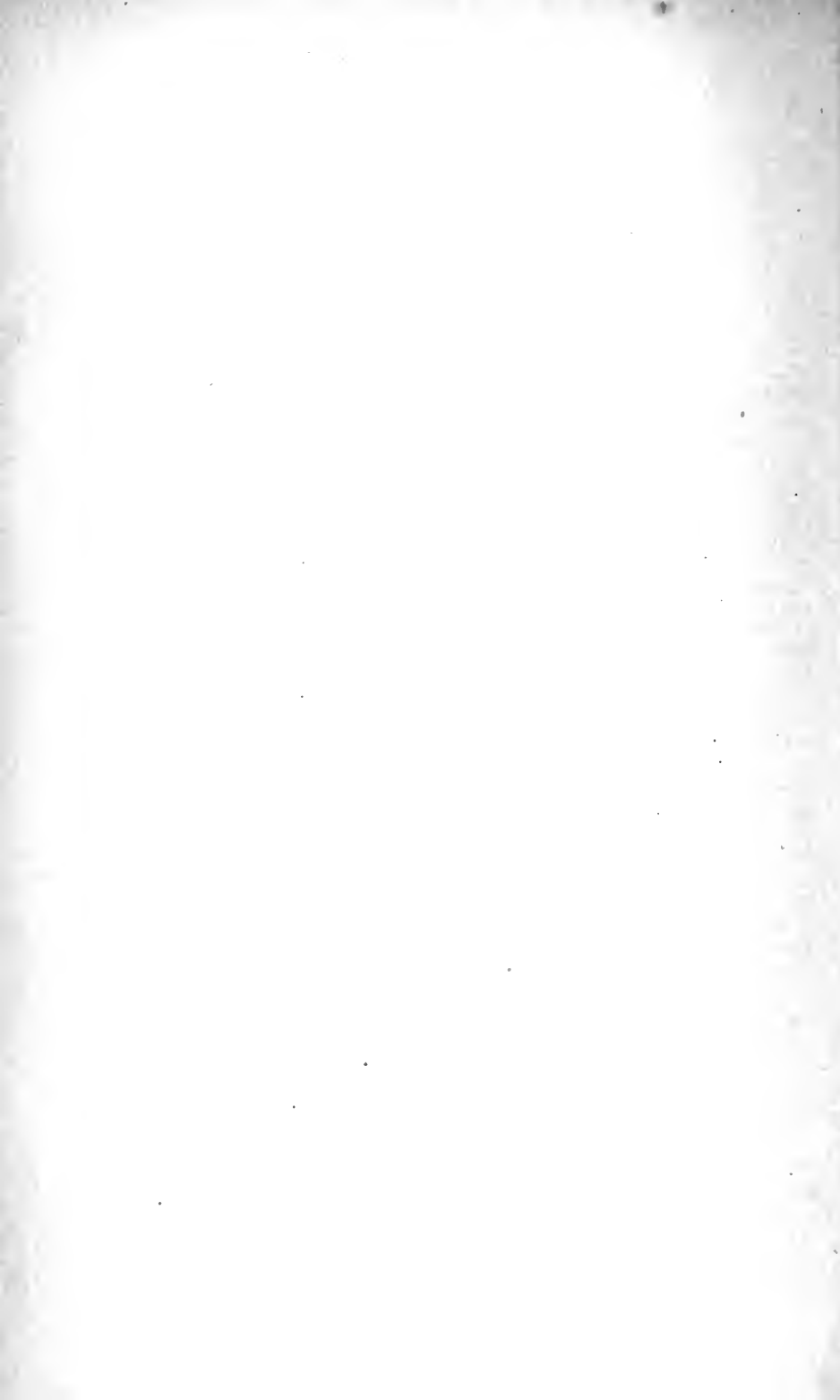
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# APPENDIX.

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# APPENDIX.

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## COMPLAINT No. 1.

BEFORE THE HONORABLE THE BOARD OF RAILROAD COMMISSIONERS.

*E. P. Wheeler vs. The Southern Pacific Railroad Company.*

E. P. Wheeler, a citizen of Kern County, and doing business in the Town of Bakersfield as a merchant, complains of the Southern Pacific Railroad Company, and for cause of complaint alleges that the rates of freight charged and exacted by the railroad company, and paid by him on merchandise coming from San Francisco, and required in his business, are excessive and exorbitant, to wit: \$2 35½ for first class of merchandise, \$1 80 for second class, and \$1 20 for third class per 100 pounds between this point and San Francisco, a distance of 314 miles; and more than the profits of his business will allow, and as compared with other railroads in the Atlantic States very unfair and unjust. For he is informed and believes that on the Atlantic and Great Western Railroad, for 319 miles, that is to say, from Salamanca to Richmond, the price on freight per first class is 63 cents per 100 pounds, second class 47 cents per 100 pounds, and third class 37 cents per 100 pounds. And on the Chesapeake and Ohio Railroad the freight, or charge for transportation of merchandise for same distance, to wit: from Huntington to Meacham, to wit, 314 miles, is for first class 81 cents per 100 pounds, second class 73 cents, and third class 58 cents per 100 pounds, which are quite reasonable, and under which a merchant might be able to live. He, therefore, prays your honorable body to order and direct that the rate of freight on the Southern Pacific Railroad be reduced to a point approximating the rates of these said roads—that is to say, that they be required to reduce the present rates to the extent of fifty per cent., and for such further relief as your honorable body may think just and proper in the premises.

*State of California, County of Kern, ss.*

E. P. Wheeler, being duly sworn, says that he is the plaintiff in the above entitled action, that he has heard read the foregoing complaint and knows the contents thereof, and that the same is true of his own knowledge, except as to matters therein stated on information and belief, and as to those matters he believes it to be true, this — day of September, 1880.

(Signed)

E. P. WHEELER.

## COMPLAINT No. 2.

BEFORE THE BOARD OF RAILROAD COMMISSIONERS IN AND FOR THE  
STATE OF CALIFORNIA.

*Richard Hudnutt vs. The Southern Pacific Railroad Company.*

And now comes before your honorable Board, Richard Hudnutt, a resident and citizen of Kern County, Town of Bakersfield, State of California, by occupation a farmer, and complains of the Southern Pacific Railroad Company, a corporation duly incorporated under the laws of the State of California, and having its principal office and place of business in the City and County of San Francisco, and for cause of complaint alleges that the said Southern Pacific Railroad Company has fixed and established, and exacts rates of freight on imports into and exports out of Kern County that are extortionate, exorbitant, and oppressive, and that he is informed and believes that it has made, and is making, unfair and unjust discriminations in favor of Los Angeles and against Kern County, its business men, and producers, by which he, in common with them, is injured and damaged by being thereby deprived of a large portion of the profits and earnings which he should rightfully derive from his business.

And for specific matters of complaint he sets forth that he is informed and believes that the average rate of freight charges between San Francisco and the Town of Bakersfield are, per carload, about as follows: First class, \$1 20 per 100 pounds; second, \$1 09; and third, \$1 01—the distance being about 314 miles; that these extortionate rates are much less than are actually paid, because, owing to the infinite subdivisions of each class of freight, and every one being charged a different rate, the agents will not take freight at the foregoing rates unless of one kind of goods, which can rarely occur, and the rates paid are almost invariably those charged on lesser quantities, averaging about fifty per cent. more than aforesaid carload rates; that he is informed and believes that these rates are on the average about six times as high as those charged on roads of corresponding and greater cost of construction as those connecting Bakersfield with San Francisco, and that have not been subsidized by the General Government, and from other sources, on the implied condition of aiding and promoting the development of the country; that he is informed and believes the average rate of freight charges between San Francisco and Los Angeles, per carload, are about as follows: First class, \$1 30 per 100 pounds; second, \$1 15; and third, \$1 08—the distance being about 482 miles. Showing that freight is carried to Los Angeles, twice the distance (the 168 miles intervening between that place and Bakersfield being equivalent in cost of construction, and steep grades, to the 314 miles of road intervening between Bakersfield and San Francisco), for the comparatively trifling additional charge of 10 cents on 100 pounds, first class; 6 cents on second class; and 7 cents on third class freight; that he is informed and believes the rate of fare between San Francisco and Bakersfield is \$17; a rate he is informed and believes three times as high as those of Eastern roads for similar service; and he is informed and believes that between San Francisco and Los Angeles it is \$23, showing that for \$5 a service is performed for Los Angeles for which Bakersfield is



charged more than three times as much, or \$17, as aforesaid; that he is informed and believes that the rate of freight on wheat, by the carload, between Bakersfield and San Francisco, is \$5 50 per ton; a rate as he is informed and believes more than twice as high as is usually charged for similar service on Eastern roads, and that leaves to the producer no adequate margin of profit to encourage its production; that he is informed and believes that the rates of freights on all other articles of farm produce are so high as to prohibit their export; that he is informed and believes that your honorable Board will find, on investigation, that no good and valid reason exists why freights and fares should not be reduced between Bakersfield and San Francisco to the same rates that are prevalent with and found profitable by railroad companies in the Eastern States, who have built their roads with their own resources, and not with those generously and trustingly given them by the government and people.

And he prays your honorable Board to examine into and remove these causes of complaint, by establishing just and proper rates of fares and freights on the roads between Bakersfield and San Francisco, and as affecting the two places named, and the points intervening, and by publishing the same in such form that they may be understood, the schedule of fares and freights on file in the Recorder's office of this county being unintelligible to those for whose benefit the law required them to be so filed.

(Signed)

RICHARD HUDNUTT.

*State of California, County of Kern, ss.*

Richard Hudnutt, being by me first duly sworn, says that he is the complainant in the above entitled suit; that he has read the foregoing complaint and knows the contents thereof, and knows it to be true, except as to such portions as are stated on information and belief, and as to those he believes them to be true.

(Signed)

R. HUDNUTT.

Sworn to before me this 31st day of August, 1880.

(Signed)

A. C. MAUDE, Notary Public.

### COMPLAINT No. 3.

BEFORE THE HONORABLE THE BOARD OF RAILROAD COMMISSIONERS  
OF THE STATE OF CALIFORNIA.

*David Hirshfield vs. The Southern Pacific Railroad Company.*

David Hirshfield, a resident of Kern County, and doing business as a merchant in the Town of Bakersfield, complains of the Southern Pacific Railroad Company, a corporation duly incorporated under the laws of the State of California, having its principal place of business in the City and County of San Francisco, and for cause of complaint alleges that the said railroad company, in utter disregard of the wants, requirements, and convenience of the people of Bakersfield, have located and established its principal depot and shipping point at a

distance of a mile and a half from the said Town of Bakersfield, to wit: at the Town of Sumner, thereby causing the merchants and other business men of the said Town of Bakersfield great trouble, expense, and delay in obtaining the goods and merchandise shipped to them from San Francisco, and other points on the line of the said Southern Pacific Railroad.

And the complainant prays your honorable body to take such means as will remedy this grievance, and direct and require said railroad company to establish a station and depot at this place, or to construct a switch to such point as will best suit the convenience of the business community of Bakersfield, upon its inhabitants agreeing to pay one half the expense. And further, your complainant prays your honorable body to extend such further relief as may seem proper in the premises.

(Signed)

W. H. BROOKS,  
Plaintiff's Attorney.

*State of California, County of Kern, ss.*

David Hirshfield, being duly sworn, says that he is the plaintiff in the above entitled action; that he has heard read the foregoing complaint, and knows the contents thereof, and that the same is true of his own knowledge, except as to matters therein stated on information and belief, and as to those matters he believes it to be true.

(Signed)

DAVID HIRSHFIELD.

Subscribed and sworn to before me this — day of September, 1880.

### COMPLAINT No. 4.

BEFORE THE HONORABLE THE BOARD OF RAILROAD COMMISSIONERS  
OF THE STATE OF CALIFORNIA.

*L. Hirshfield & Co. vs. The Southern Pacific Railroad Company.*

The said complainant, acting by Herman Hirshfield, a resident of and doing business in the Town of Bakersfield, Kern County, State aforesaid, complain of the Southern Pacific Railroad Company, a corporation duly incorporated under the laws of the State of California, having its principal place of business in the City and County of San Francisco, and for cause of complaint allege, that sometime in August last he received from Tulare 200 sacks of potatoes weighing in the aggregate the sum of 20,000 pounds, or ten round tons, and was charged freight therefor the sum of \$63, and which he paid. That the distance from Sumner to Tulare is 63 miles, and they therefore paid at the rate of 10 cents per ton per mile, which he considers extortionate and unjust, and therefore prays your honorable body to establish and fix a rate of freight between the Towns of Sumner and Tulare that will be more in accordance with the rates charged upon other railroads, and thus will permit your complainant to make a living profit for his goods.

(Signed)

H. HIRSHFIELD.

*State of California, County of Kern, ss.*

H. Hirshfield, being duly sworn, says that he is the plaintiff in the above entitled action; that he has heard read the foregoing complaint, and knows the contents thereof, and that the same is true of his own knowledge, except as to matters therein stated on information and belief, and as to those matters he believes it to be true.

H. HIRSHFIELD.

Subscribed and sworn to before me this 9th day of September, A. D. 1880.

A. C. MAUDE, Notary Public.

### COMPLAINT No. 5.

BEFORE THE HONORABLE BOARD OF RAILROAD COMMISSIONERS OF THE  
STATE OF CALIFORNIA.

*W. H. Scribner vs. The Southern Pacific Railroad Company.*

W. H. Scribner, a resident of Kern County, doing business in Bakersfield as a merchant, complains of the Southern Pacific Railroad Company, a corporation duly incorporated under the laws of the State of California, having its principal place of business in the City and County of San Francisco, and for cause of complaint alleges: that the rate of fare for the transportation of passengers to and from this place and San Francisco, and to and from the intermediate places, is very much too high for the convenience of travelers, and for the promotion of that frequent and intimate intercourse which is especially to be desired among neighboring towns. And the said complainant alleges that said rates of fares seem to be fixed by no just rule, but rather by an arbitrary one of the company, which, to some places, is unfair and unjust. That he has been shown some statements comparing the rates of the Southern Pacific Railroad with those of other railroad companies in the Eastern and Atlantic States, and he is informed that on the former the rate varies from  $3\frac{1}{2}$  cents per mile to 6 cents per mile between San Francisco to Los Angeles, while on the latter the rates run from  $2\frac{1}{2}$  to  $3\frac{1}{2}$  cents per mile, fixed and certain, irrespective of the situation of the intermediate points. And, therefore, the complainant prays that the rate of fares charged on the Southern Pacific Railroad be reduced in a just ratio to that of the Atlantic roads, and that the same be fixed at so much, say  $3\frac{1}{2}$  cents per mile for each passenger for unlimited tickets, and 3 cents for limited tickets, or round trip. And your complainant prays your honorable body to adjust said rates in accordance with this complaint, and will give such further relief as may seem just and proper in the circumstances.

(Signed)

W. H. SCRIBNER.

W. H. Scribner, being duly sworn, says that he is plaintiff in the above entitled action; that he has heard read the foregoing complaint, and knows the contents thereof, and that the same is true of

his own knowledge, except as to matters therein stated upon information and belief, and as to those matters he believes it to be true.

(Signed)

W. H. SCRIBNER.

Subscribed and sworn to before me this 9th day of September, A. D. 1880.

A. C. MAUDE, Notary Public.

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## COMPLAINT No. 6.

BEFORE THE BOARD OF RAILROAD COMMISSIONERS OF THE STATE OF CALIFORNIA.

*Michael Purcell vs. The Southern Pacific Railroad Company.*

Michael Purcell, a citizen of the United States, a resident of Kern County, State aforesaid, and by occupation a sheep raiser, complains of the Southern Pacific Railroad Company, a corporation duly incorporated under the laws of the State of California, having its principal place of business in the City and County of San Francisco, and for cause of complaint alleges that the said company has established a rate of freight for the transportation of merchandise from Bakersfield to San Francisco which is excessive and exorbitant, and oppressive, injurious to the interests of the people, and having a tendency to impoverish the industrious citizen of Kern County, by depriving them of a large portion of their profits and earnings to which their efforts in their respective business justly entitles them. And for a special cause of complaint alleges that having occasion to ship a large quantity of wool, to wit: a carload from Poso Creek to San Francisco, he was informed the price or charge for such transportation was one hundred and fifty-five dollars for the same, which he considers excessive and exorbitant, and unfair, for this reason, among others, that for the same class of merchandise the charge for transportation from Los Angeles to San Francisco is also one hundred and fifty-five dollars, which he regards as very unfair and unjust; the distance from Los Angeles to San Francisco is 188 miles greater than from Poso to San Francisco; and because it is an unjust discrimination in favor of Los Angeles and against Poso, and the inhabitants of Kern County generally. And, therefore, he prays your honorable body will consider this complaint, and will take such measures as will tend to adjust, arrange, and reduce said rates of freight so that they will bear more equally and less oppressively on the complainant, and others of his fellow-citizens who are in the same business as himself.

(Signed)

M. H. PURCELL.

*State of California, County of Kern, ss.*

Michael Purcell, being duly sworn, says that he is the plaintiff in the above entitled action; that he has heard read the foregoing complaint, and knows the contents thereof, and that the same is true of

his own knowledge, except as to matters therein stated on information and belief, and as to those matters he believes it to be true.

(Signed)

M. H. PURCELL.

Subscribed and sworn to before me this 31st day of August, 1880.

A. C. MAUDE, Notary Public.

## COMPLAINT No. 7.

BEFORE THE BOARD OF RAILROAD COMMISSIONERS OF THE STATE OF CALIFORNIA.

*J. A. Clarke vs. The Southern Pacific Railroad Company.*

J. A. Clarke, a resident of Kern County, State of California, and by occupation a farmer, complains of the Southern Pacific Railroad Company, a corporation duly incorporated under the laws of the State of California, having its principal place of business in the City and County of San Francisco, State aforesaid; and for cause of complaint alleges that said company have fixed and established and exact a rate of fares for passengers, and of charges for freight on merchandise passing over their railroad from San Francisco to Bakersfield, and to intermediate and neighboring places, which are exorbitant, extortionate, and oppressive, and that they have a tendency to injure and destroy his own business and that of every other farmer in the county, by depriving him and them of all that portion of the profits of their vocation to which their toil and industry entitle them. And for a special cause of complaint, he alleges that in the latter part of June last he was about to ship from Sumner to Modesto four mules. He was charged for freight on each of said animals the sum of twenty (\$20) dollars, but he refused to pay it, because he considered it excessive. But on further inquiry he was informed that he could send a carload for \$44; and this being so much cheaper, he took an entire car and sent them in it. And on further inquiries he learned that he could have sent a carload, to wit: sixteen mules, for the same money; and even this was a great deal more than what it would have cost him to have driven his mules to Modesto. That further inquiries developed the fact that he could ship one mule for \$20, two mules for \$30, three mules for \$36, and four mules for \$48. He complains of this mode of rating the freight, and these charges, because they are unfair and unjust; and while burdensome and oppressive to himself, exert an unfair and wrongful discrimination towards others in the same business as himself, and for the especial reason that it operates constantly in favor of the rich and against the poor stock raiser or farmer, for it is evident that under such a system the more mules a shipper had the cheaper he could ship them; which is against good policy, and tends to the oppression of the poor and to the impoverishment of the county, for where all do not have an equal chance few can thrive. And first asking the permission of your honorable body, while still maintaining that the above charges are burdensome and oppressive

in the extreme, and praying that they be much reduced, he suggests that it should be so arranged and ordered that whenever three or as many as four or more mules are going on the same train, though shipped by as many different persons, each one should be charged only his proportion of the price per carload, say  $\frac{1}{16}$ ,  $\frac{2}{16}$ ,  $\frac{3}{16}$ , and so on, according to the respective ownership of said mules, and in the same proportion with other animals. And he, therefore, prays your honorable body that in this manner, or in some other that may seem to your superior wisdom more expedient, to reduce, regulate, and adjust the price of transportation of this and other kinds of animals, so that it will bear less oppressively and more equally on all classes of shippers, the rich and the poor alike.

(Signed)

J. A. CLARKE.

*State of California, County of Kern, ss.*

J. A. Clarke, being duly sworn, says that he is the plaintiff in the above entitled action; that he has heard read the foregoing complaint, and knows the contents thereof, and that the same is true of his own knowledge, except as to matters therein stated on information and belief, and as to those matters he believes it to be true.

J. A. CLARKE.

Sworn and subscribed to before me this 3d day of September, 1880.

A. C. MAUDE, Notary Public.

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### COMPLAINT No. 8.

BEFORE THE HONORABLE THE BOARD OF RAILROAD COMMISSIONERS OF  
THE STATE OF CALIFORNIA.

*A. Weill & Co. vs. The Southern Pacific Railroad Company.*

The complainant, A. Weill, of the firm of A. Weill & Co., merchants residing and doing business in the Town of Bakersfield, Kern County, State aforesaid, complains of the Southern Pacific Railroad Company, a corporation duly incorporated under the laws of the State of California, and having its principal place of business in the City and County of San Francisco, and for cause of complaint alleges that the rates of fares for passengers between this point and San Francisco, and between this place and intermediate places, is much too high, being an average price of five (5) cents per mile for each passenger, while on the railroads in the Eastern States, or Atlantic States, it never exceeds three and a half ( $3\frac{1}{2}$ ) cents per mile, and on some roads it is as low as two and a half ( $2\frac{1}{2}$ ) cents per mile. Wherefore, complainant prays your honorable body to reduce this rate of fare to four (4) cents per mile at least, and establish the rate of charges at so much per mile per head as is the custom on the railroads of the Atlantic States, without respect to situation as to intermediate or terminal points.

(Signed)

A. WEILL.

*State of California, County of Kern, ss.*

A. Weill, being duly sworn, says that he is the plaintiff in the above entitled action; that he has heard read the foregoing complaint, and knows the contents thereof, and that the same is true of his own knowledge, except as to matters therein stated on information and belief, and as to those matters he believes it to be true.

Subscribed and sworn to before me, this — day of —, A. D. 1880.

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## COMPLAINT No. 9.

BEFORE THE HONORABLE BOARD OF RAILROAD COMMISSIONERS.

*R. M. Holtby vs. The Southern Pacific Railroad Company.*

R. M. Holtby, a resident of Kern County, by occupation a stock raiser, complains of the Southern Pacific Railroad Company, a corporation duly incorporated under the laws of the State of California, having its principal place of business in the City and County of San Francisco, and for cause of complaint alleges that he is in the habit of shipping stock, more especially sheep, to San Francisco, and by the said Southern Pacific Railroad, by the carload, and though he has repeatedly asked the company owning said road, through its authorized agent at Sumner, to have two floors put into each car, so as to accommodate more sheep, as he believes is the practice on other railroads, at the same price per car. The railroad company has as repeatedly refused, and still refuses, and will not allow more than one floor to be used, or to be placed in said car; and yet they charge for this one floor car the same price that they should for the two floors; and he, therefore, prays that your honorable body will order and direct said company to provide two floors in such cars as are used in shipping sheep, and also as is done on other roads, and charge the same price per carload; and that your honorable body will give such further relief as may seem just and proper in the premises.

*State of California, County of Kern, ss.*

R. M. Holtby, being duly sworn, says that he is the plaintiff in the above entitled action; that he has heard read the foregoing complaint, and knows the contents thereof, and that the same is true of his own knowledge, except as to matters therein stated on information and belief, and as to those matters he believes it to be true.

(Signed)

R. M. HOLTBY.

Subscribed and sworn to before me this 9th day of September, A. D. 1880.

I. W. TRUMAN, Notary Public.

## COMPLAINT No. 10.

BEFORE THE HONORABLE THE BOARD OF RAILROAD COMMISSIONERS OF  
THE STATE OF CALIFORNIA.

*Geo. C. Doherty vs. The Southern Pacific Railroad Company.*

Geo. C. Doherty, a resident of Kern County, State aforesaid, and a bee rancher by occupation, complains of the Southern Pacific Railroad Company, a corporation duly incorporated under the laws of the State of California, and having its principal place of business in the City and County of San Francisco, and for cause of complaint alleges that said company has fixed, established, and exacts a price or rate of freight upon the transportation of merchandise between here and San Francisco which is exorbitant, excessive, and oppressive, and tending to injure or destroy nearly every industry in the county. And, for a special cause of complaint, alleges that as a producer of comb and extracted honey, the pursuit and development of which industry promises to become one of importance in this county, and that being entirely dependent on San Francisco and foreign export trade for a wholesale market, and that the said company's freight rate on this class of produce reduce the profits to that extent that it will not admit of its further production; that all honey frames, shipping cases, etc., for comb honey, and tins, barrels, etc., for extracted honey, are brought from San Francisco, thus paying freight both ways, rate \$1 20 per hundred pounds, on all packages and frames, said frames being detached and packed in compact form. That the present rate on comb honey, \$1 20 per 100 pounds gross, would incur a freight expense of over \$2 per 100 pounds net, while the present rate on extracted honey, 55 cents per 100 pounds, including freight both ways on cases and tins, amounts to \$1 per 100 pounds net. That this shipping expense is nearly three times as much as on other roads for the same class of produce. Wherefore, he prays your honorable body will consider this complaint, and will take such measures as will tend to adjust, average, and reduce said rates of freight so that they will bear less oppressively on this complainant, and on other of his fellow-citizens who follow the same business in this county.

(Signed)

GEO. C. DOHERTY.

*State of California, County of Kern, ss.*

Geo. C. Doherty, being duly sworn, says that he is the plaintiff in the above entitled action; that he has heard read the foregoing complaint, and knows the contents thereof, and that the same is true of his own knowledge, except as to matters therein stated on information and belief, and as to those matters he believes it to be true.

(Signed)

GEO. C. DOHERTY.

Subscribed and sworn to before me this 8th day of September, 1880.

A. C. MAUDE, Notary Public.



## COMPLAINT No. 11.

BEFORE THE BOARD OF RAILROAD COMMISSIONERS IN AND FOR THE  
STATE OF CALIFORNIA.

*A. S. Hoffman vs. The Southern Pacific Railroad Company.*

And now comes before your honorable body A. S. Hoffman, a resident of the Town of Bakersfield, Kern County, State of California, and doing business as a wholesale liquor and cigar dealer, and complains of the Southern Pacific Railroad Company, a corporation duly incorporated under the laws of the State of California, and having its principal place of business in the City and County of San Francisco, and for cause of complaint alleges that the said company has fixed and established and exacts rate of freights upon such merchandise as he requires in his business, to wit: wines, liquors, and cigars, that is extortionate, exorbitant, and oppressive, and he is informed and believes that it has made and is making unfair and unjust discrimination in favor of names, persons, and places, and against Bakersfield and its business men, by which he, in common with them, are injured and damaged by being thereby deprived of a large portion of the earnings and profits which he should rightfully derive from his business; and for a special cause of complaint, he alleges that in the month of March, 1880, he received at Sumner, from the agent of the said Southern Pacific Railroad Company, in one instance, on March 23d, 1880, two (2) barrels and two (2) half-barrels of whisky, which were shipped to him from Covington, Kentucky, for the freight on which was charged, and he paid from Covington to Sacramento, the sum of thirty-six dollars and thirty cents (\$36 30), being for a distance of about 2,000 miles, while from Sacramento to Bakersfield, a distance of about 300 miles, he was charged and paid \$16 31, which he deems and so declares to be greatly disproportionate, unjust, and unfair. And in another instance, on the 20th March, 1880, he received from said agent at Sumner one barrel of whisky and one half-barrel of whisky, which was shipped to him from Chicago, Illinois, on which he was charged for freight on the same from Chicago to Stockton, a distance of about 2,000 miles, the sum of \$16, and from Stockton to Bakersfield, a distance of about 300 miles, say one sixteenth this distance, he was charged \$7 59, which he deems to be and so declares in comparison entirely disproportionate and a great injustice on the part of the Southern Pacific Railroad Company. And he prays your honorable body to examine into and adjust the rates of freight of said Southern Pacific Railroad Company so that they shall not be so unfair and unjust and onerous on your complainant and his fellow sufferers.

(Signed)

AUG. S. HOFFMAN.

*State of California, County of Kern, ss.*

A. S. Hoffman, being duly sworn, says that he is the plaintiff in the above entitled action; that he has heard read the foregoing complaint, and knows the contents thereof, that the same is true of his own knowledge, except as to matters therein stated on information and belief, and as to those matters, he believes it to be true.

Subscribed and sworn to before me this 2d day of September, 1881.

A. C. MAUDE, Notary Public.

## COMPLAINT No. 12.

TO THE HONORABLE THE BOARD OF RAILROAD COMMISSIONERS OF THE  
STATE OF CALIFORNIA.

*State of California, County of Fresno, ss.*

The undersigned, Frank Dusy, a resident of Fresno County, aforesaid, respectfully represents to your honorable body that he has been a resident of said county for the past sixteen years, and that for the past eight years he has been and still is engaged largely in the business of raising sheep, and selling sheep and wool in the San Francisco market. That in order to compete with other dealers in the same market it is necessary for the wool growers of Fresno County to send their products to San Francisco on the freight trains of the Central Pacific Railroad Company, Visalia Division. That the charges of said company for a carload of sheep from Fresno to San Francisco are fifty-four dollars. That an ordinary carload of full grown sheep numbers about 90 head, of an average weight of 100 pounds per head, or 9,000 pounds in the aggregate, or 500 pounds less than half the weight of a carload. The undersigned is informed and believes that it is entirely practicable for said railroad company, at trifling expense, to construct in each stock car used for the transportation of sheep, a movable platform, or deck, at half of the inside height of the car, on which can be carried with perfect safety and convenience an additional 90 head of sheep, thus doubling the present loads, but not increasing the entire weight to over 9 tons. If such plan shall be adopted by the company there will be no objection to the charge of fifty-four dollars per carload. But if such plan is not adopted, the undersigned respectfully submits that the present rate of charges is twice as great as it should be, and prays that such steps may be taken, and such order made by your honorable body in the premises as shall regulate such charges of the railroad company, and render them just, fair, and equitable to all parties concerned. The undersigned, further respectfully represents that the charges of said company upon wool shipped from said Town of Fresno to San Francisco are \$100 per carload, and that such carloads of wool do not average over 18,000 pounds, or 9 tons each. That said company charges for a carload of wheat of 10 tons, sent over the same route, only — dollars. The reason and justice of so great a discrimination against the article of wool is not apparent to your petitioner, and he, therefore, respectfully prays that you will make such orders in the premises as will place the freight tariff of said company, so far at least as it affects the article of wool, on a basis of justice and equity. Your petitioner further respectfully represents that at the Fresno ticket office of said company no tickets are permitted to be sold, and no tickets can be bought except first class tickets. And that where circumstances make it necessary for a passenger to accept a second class or third class fare, they have not the corresponding privilege of buying a second class or third class, but are compelled, in all cases, to buy and pay for first class tickets. That the evident and inevitable result is that the passenger from Fresno pays for his trip to San Francisco a much larger amount than many of his fellow travelers over the

same distance. He, therefore, respectfully asks such action on the part of your honorable body as will eventuate in the abolishment of the odious and unjust system that now exists and controls the rates of fares and freights to and from the Town of Fresno. Your petitioner further represents that on or about the 23d day of July, 1880, he shipped on the freight cars of the said railroad company, at Niles' Station, in Alameda County, California, 34 bucks, to be brought to Fresno. That the freight charges on said bucks, he being in personal charge of them, and assuming all risk of personal injury, was \$38 40, of which he does not complain. Said freight train, with said bucks on board, then ran from said Niles' Station into the City of Oakland, in said Alameda County, and thence to Fresno, making a trip of about 222 miles. When said freight train and bucks reached Fresno, he desired to have said bucks transported to Fowler's Station, 9½ miles south of Fresno, and they were neither taken out of said cars nor was said car unhooked from said train, but continued in its former relative position. But your petitioner was, at Fresno, compelled to make a new contract with said company for carrying said bucks to Fowler's Station, and to pay them the further sum of \$5, which sum was afterwards increased to \$7, by order of C. J. Wilder, an officer of said company; and such additional charge was paid by your petitioner, thus making a charge of \$7 for carrying a carload 9½ miles, which had just been transported 222 miles for \$38 40. Your petitioner further represents that he is charged, and compelled by said company to pay them \$10 per carload of wool (of 18,000 pounds), from said Fowler's Station to said Town of Fresno. Your petitioner, therefore, in conclusion, respectfully asks that your honorable body will give to the foregoing statements such attention and examination as may be necessary and proper, and that you will take such action in the premises as is necessary to establish justice, and enforce equity as between said railroad company and those who are compelled to travel or send freight over its routes.

(Signed)

FRANK DUSY.

FRESNO, September 8, 1880.

Subscribed and sworn to before me, on the 8th day of September, 1880, at Fresno, California.

(Signed)

C. J. BEERSTECHEER,  
Railroad Commissioner, Second District.

### COMPLAINT No. 13.

BEFORE THE HONORABLE THE BOARD OF RAILROAD COMMISSIONERS  
OF THE STATE OF CALIFORNIA.

*J. D. Stockton vs. The Southern Pacific Railroad Company.*

J. D. Stockton, a resident of Kern County, and a farmer by occupation, complains of the Southern Pacific Railroad Company, a corporation duly incorporated under the laws of the State of California, and having its principal place of business in the City and County of

San Francisco, and for cause of complaint alleges that the said company has fixed and established and exacts a price or rate of freight upon the transportation of merchandise and produce, between this place and San Francisco, which is exorbitant, oppressive, and excessive, and tending to injure and destroy nearly every industry in the county; and for a special cause of complaint alleges and declares that he applied to the company's agent at Sumner for an empty freight car, and was asked by said agent what kind of freight he intended to ship; on being told that it was alfalfa seed, he was informed that the cost would be \$180 per carload, whereas for wheat the company demanded only \$60 per carload. That at that exorbitant rate of freight he would lose his ratio of aggregate \$246 on a carload of alfalfa seed, not saying anything about the cost of land, clearing, sowing, and caring for the same, to wit: mowing, \$1 per acre; hauling and stacking, \$3 per acre, with four men to clear the swath; thrashing, \$70 per day (averaging 3,000 pounds); three men recleaning the same, \$8 per day; sacking and hauling, half cent per pound; the yield per acre being 100 pounds merchantable seed; or in other words, the cost would be as follows:

Cutting .....	\$200 00
Hauling, including the time of men to keep the grain out of the way of the horses, \$3 an acre .....	600 00
Thrashing .....	666 00
Sacking and hauling .....	100 00
Cost of car .....	180 00
Total .....	\$1,746 00
10 tons, at \$150 per ton .....	1,500 00
My ratio of loss to the aggregate .....	\$246 00

Wherefore, he prays your honorable body will consider this complaint, and will take such measures as will tend to adjust, arrange, and reduce said rates of freight so that they will bear more equally and less oppressively on the complainant and others of his fellow citizens who are in the farming business in this county.

*State of California, County of Kern, ss.*

J. D. Stockton, being duly sworn, says that he is the plaintiff in the above entitled action; that he has heard read the foregoing complaint, and knows the contents thereof, and that the same is true of his knowledge, except as to matters therein contained on information and belief, and as to those matters he believes it to be true.

(Signed)

J. D. STOCKTON.

Sworn to and subscribed before me this 7th day of September, 1880.

A. T. LEIGHTON, County Clerk.

## COMPLAINT No. 14.

BEFORE THE HONORABLE BOARD OF RAILROAD COMMISSIONERS OF  
THE STATE OF CALIFORNIA.

*P. Galtes vs. The Southern Pacific Railroad Company.*

This complainant, P. Galtes, a merchant doing business in the Town of Bakersfield, Kern County, State aforesaid, complains of the Southern Pacific Railroad Company, a corporation duly incorporated under the laws of the State of California, having its principal place of business in the City and County of San Francisco, and for cause of complaint alleges that the rate of freight on merchandise from San Francisco to this place, being at the rate of \$1 20, \$1 80, and \$2 35½ per 100 pounds, is entirely too high. That he ought to pay for freight and fares as low rates as on any other railroad of the United States, or at least to obtain the lowest rates established in our own State; for instance, from San Francisco to Arizona, in proportion, and that the company should charge so much per mile both for freights and fares. That the public should not be charged 10 cents for State toll for every small bill of goods, but charge only at the rate of 10 cents per ton. That sometime in May complainant had in San Francisco the shelvings and counters of his new brick store, whose weight would not quite load two flat cars. He proposed to the company to take two flat cars and to load them with that one class of goods, but the company would not admit of such a proposition, and they charged him the highest rate per 100 pounds, to wit: \$2 62½ per 100 pounds. That he had about one and three-quarter carloads, and that it cost him \$492, and that if he is not mistaken, a flat car then cost from \$60 to \$80. That such abuses ought to be abolished. That the company ought not to charge for goods shipped in bales \$180, when the same being in cases are \$120, such as overalls, blankets, etc. He claims that if a merchant or farmer has miscellaneous goods (not dangerous), to ship, he should be allowed to load a car by paying carload rates as established. Wherefore, he prays your honorable body will consider this complaint and will take such measures as will tend to adjust, arrange, and reduce such rates so that they will bear more equally and less oppressively on the complainant, and the community at large.

(Signed)

PAUL GALTES.

*State of California, County of Kern, ss.*

Paul Galtes, being duly sworn, says that he is the plaintiff in the above entitled action; that he has heard read the foregoing complaint, and knows the contents thereof, and that the same is true of his own knowledge, except as to matters therein stated on information and belief, and as to those matters he believes it to be true.

Subscribed and sworn to before me this — day of — A. D. 1880.

A. C. MAUDE, Notary Public.

CENTRAL PACIFIC RAILROAD COMPANY,  
 GENERAL SUPERINTENDENT'S OFFICE,  
 SAN FRANCISCO, December 8, 1880. }

*To the honorable Board of Railroad Commissioners:*

GENTLEMEN: On receipt of complaints filed with your honorable Board, I at once took the matter up with our General Freight Agent, and asked him to investigate carefully and report to me on all matters pertaining to complaints relative to the affairs of his department, and his reply is so complete and exhaustive that I deem it well to submit it herewith without comment.

In reply to complaints made by various parties concerning exorbitant rates of fare, and especially those made by W. H. Scribner and A. Weill, both of Bakersfield, claiming that passenger rates on the Southern Pacific Railroad are too high, and making comparison with rates prevailing elsewhere, I would say that the nature of the complaints being nearly identical, I will deal with that more especially of Mr. Weill.

He alleges that the rates of fare for passengers between Sumner and San Francisco, and between Sumner and intermediate points, is much too high, being an average price of 5 cents per mile for each passenger, while the rates in the Eastern and Atlantic States never exceed  $3\frac{1}{2}$  cents per mile, etc., and prays your honorable body to reduce the rate of fare to 4 cents per mile, etc.

If it be a fact that the rates in the Eastern and Atlantic States never exceed  $3\frac{1}{2}$  cents per mile, it is no reason why the rates in California should not exceed 4 cents per mile. Such a comparison is of very slight value, as the rate of fare varies upon different roads, and must vary greatly according to the nature of the country through which it runs. Some roads are located through manufacturing centers, thickly settled sections of the country, on which the amount of traffic ranges all the way from 15 to 2,500 per cent. greater than on another class of roads built through grazing and agricultural sections of the State, or other States. Thus, you see the rates are governed by the volume of business and cost of operating. Take, if you please, Massachusetts, which has 238 people to the square mile, and 994 people to one mile of railroad, while California has but four people to the square mile, and 371 people to a mile of railroad.

Since the gentleman draws the comparison, however, between the roads of California and those of other sections, it is perhaps proper I should mention the fact that the number of passenger trains running between Sumner and San Francisco, 314 miles, is one a day each way, with a very light passenger business, the rate for a round trip ticket being \$27, or  $4\frac{3}{16}$  cents per mile; while the distance from New York to Washington, for illustration, is 230 miles, fare \$7 50, or at a rate per mile of  $3\frac{3}{16}$  cents; New York to Baltimore, 188 miles, \$6 20, or  $3\frac{3}{16}$  cents per mile; New York to Hartford, 110 miles, \$3 75, or  $3\frac{4}{16}$  cents per mile. There are run, per time table, between New York and Philadelphia, over which line this Washington business goes, 56 passenger trains per day; between Philadelphia and Baltimore, 14; Baltimore and Washington, 48; and between New York and Hartford, 20. All of these trains have many cars filled with passengers.

The inequality alone in the volume of traffic would seem to fully justify the rates now in force upon the Central Pacific Railway.

Still another illustration: Between London and Paris, distance 283 miles, a single trip ticket, first class, is \$15, or  $5\frac{3}{10}$  cents per mile; round trip ticket, first class, is \$23 75, or  $4\frac{2}{10}$  cents per mile. The distance from San Francisco to Sumner is 314 miles; first class single fare is \$17, or  $5\frac{4}{10}$  cents per mile; round trip ticket (as already stated) is \$27, or  $4\frac{3}{10}$  cents per mile. Thus it will be seen that the rate between the two largest cities of Europe, between which there is an immense through as well as local traffic constantly passing, where labor, and all railroad supplies, are far below what they are in California, the charge is but one tenth of a cent per mile less than that of the Central Pacific Railroad Company, over which the business passing is but a mere trifle when compared to that enjoyed by the great lines between London and Paris. I may also add that the passengers are allowed but 56 pounds of baggage there, while the Central Pacific allows 100 pounds to every passenger free.

I know how easy a matter it is for people to complain who are expected to pay for what they have or enjoy, whether it be for the necessities of life, for luxuries, or for railroad service. And, indeed, it is really surprising to me that your honorable Board has received so few complaints from the people of the many places you have visited.

Those of a specific character we have endeavored to answer in a way we believe will prove satisfactory to your honorable Board—making corrections of errors and misstatements made by some of the complainants. Those complaints of a general character are more difficult to meet, except by a general denial, and the broad and open declaration that the rates in California are lower in proportion to the amount of traffic, cost of labor, number of inhabitants to the mile of road, or to the settlement of the territory, than in any other State or Territory in this or any other country in the world that we have any knowledge of.

In conclusion, I will say that a diversity of opinion exists as to what is a fair charge to be paid for certain services performed by the railroads of the country, and it seems to me no one can have a better knowledge of this than those who are most competent to judge of the carrying capacity of a road, and the amount of disbursement absolutely necessary to meet its obligations, and to operate and keep the property up to the highest standard of excellence, which is as essential to the patrons as its owners.

I am, very respectfully, yours,

(Signed)

A. N. TOWNE,  
General Superintendent.

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CENTRAL PACIFIC RAILROAD COMPANY,  
GENERAL FREIGHT AGENTS' OFFICE,  
SAN FRANCISCO, December 8, 1880. }

A. N. TOWNE, Esq., *General Superintendent Central Pacific Railroad,  
San Francisco:*

DEAR SIR: I beg to own receipt of your letter of the 2d instant, covering copies of eleven (11) complaints filed with the Board of Railroad Commissioners during its several tours through the State,

and instructing me to carefully examine same, and report fully upon the facts and circumstances connected with each case.

The complaints referred to are as follows: No. 1, by E. P. Wheeler, merchant, Bakersfield; No. 2, by Richard Hudnutt, farmer, Bakersfield; No. 4, by M. Hirshfield, through H. Hirshfield, merchant, Bakersfield; No. 6, by Michael Purcell, sheep raiser, Kern County; No. 7, by J. A. Clarke, farmer, Kern County; No. 9, by R. M. Holtby, stock raiser, Kern County; No. 10, by George C. Doherty, bee raiser, Kern County; No. 11, by A. S. Hoffman, liquor dealer, Bakersfield; No. 12, by Frank Dusy, wool grower, Fresno County; No. 13, by J. D. Stockton, farmer, Kern County; No. 14, by P. Galtes, merchant, Bakersfield.

With but few exceptions, they uniformly state that the rates of freight charged by this company are excessive, the language of some being that the charges are such as to deprive them, the complaining parties, of the large portion of the profits to which they are justly entitled, and that they tend to destroy every industry of Kern County and prohibit production. In nearly every case the tariff of this company is measured by the information and belief of complainants concerning the tariffs of the railroads in the Eastern States. The general statements are nearly all accompanied by examples of special causes of complaint. By noticing these I think the whole ground will be covered.

#### COMPLAINT No. 1,

States the freight rate for general merchandise between San Francisco and Bakersfield (Sumner) to be, for first class \$2 35½, second class \$1 80, third class \$1 20 per hundred pounds, and that those rates are unfair and unjust, by comparison with those charged on Eastern railroads for like distance. As examples of the charges on Eastern railroads, the following are given: Atlantic and Great Western Railway, first class 63 cents, second class 47 cents, third class 37 cents per 100 pounds. Chesapeake and Ohio Railroad, first class 81 cents, second class 73 cents, third class 58 cents per 100 pounds. These rates—that is, the rates of either or both of above roads, are deemed *reasonable, and such as merchants might live under*. The extent of the inquiry and investigation made by the first party to this complaint, is shown by the fact that at the start he misrepresents the rates charged by this company. Instead of being \$2 35½, \$1 80, and \$1 20, per 100 pounds, on first, second, and third classes, respectively, between San Francisco and Sumner, they are but \$1 20, \$1 07, and \$1 01, per 100 pounds, respectively.

His information and belief concerning the charges of the Eastern roads, whose rates he professes to give, may be no better than they are above shown to be concerning the charges of this company. Therefore his statements are not entitled to credence, however honest his motives may be. But assuming that he gives the correct rates of the Eastern roads referred to, he admits that the rate of either or both "are quite reasonable, and under them a merchant might be able to live." Yet there is a difference between the schedules for like distances of 21 per cent., 35 per cent., and 36 per cent., for first, second, and third classes, respectively. He, therefore, must regard it wholly reasonable for one railroad company to charge more than another for a haul of the same length, and that it is possible for merchants on



these different roads to live. I call attention to this point simply to illustrate, what is known by all intelligent men, who have given the subject of transportation any attention, namely, that the rates of railroad companies are and must be governed by circumstances, such as the conditions of trade, the character of the road, and nature and extent of competition, the volume, kind, and distribution of the traffic, the cost of labor, fuel, supplies, etc. Now, then, if the party to this complaint can, from a disinterested standpoint, justify a difference of from 21 per cent. to 36 per cent. between the charges for a similar service of the Atlantic and Great Western Railway and those of the Chesapeake and Ohio Railroad, it certainly is not unreasonable to suppose that, were he standing in the same relation to this company, he could as easily justify a difference of from 32 per cent. to 42 per cent. (which is all there is) between the charges of this company and those of the Chesapeake and Ohio Railroad Company for a similar service. The Eastern roads referred to run through the thickly peopled States of Pennsylvania, Ohio, Indiana, and Virginia. They carry a thousand tons of freight and a thousand passengers to one carried by the line on which Sumner is located. The products, manufactures, and supplies of over forty millions of people are more or less tributary to their lines, which, as a rule, are taxed to their maximum capacity. The roads of *this* company have but a limited traffic. The products and supplies of less than a million people are tributary to them, and the ordinary capacity of their single track is from five to twenty times greater than their traffic. Under these circumstances a comparison of the charges of this company with those of the railroads in the Atlantic States, which does not include all the elements bearing upon the question and necessary to an intelligent judgment upon it, is not a fair comparison, and certainly will not aid the Board of Railroad Commissioners to an intelligent determination of the questions brought before it. What has been said above is equally applicable to all the complaints before me of excessive charges.\* The sole ground for each complaint is the alleged information and belief of complainants regarding the relative charges of Eastern roads.

#### COMPLAINT No. 2.

"Charges that the freight rates between San Francisco and Bakersfield are per carload as follows: First class, \$1 20; second class, \$1 09; third class, \$1 01 per 100 pounds, and that even these rates are much less than what are actually collected, because infinite subdivisions of each class of freight are made, and the railroad agents will not take freight at the rates above quoted unless it is entirely of one kind of goods, which can rarely occur; and that hence the rates paid are almost invariably those charged on lesser quantities, averaging fifty per cent. more than the aforesaid carload rates, namely: \$2 35½, \$1 50, and \$1 20 per 100 pounds, respectively."

It is very difficult to get at what this party means by the language of the complaint. But I notice that the rates first above quoted under this head are stated as "carload rates;" that is, it is alleged that the rates of \$1 20, \$1 09, and \$1 01, per 100 pounds, respectively, apply *only when straight carloads of goods are shipped*. This is a mistake, so far as the first class rate of \$1 20 per 100 pounds is concerned. That is the rate per 100 pounds on all ordinary merchandise, regardless of the quantity shipped, whether great or small. It is, therefore,

not true that the charges are invariably 50 per cent. more than \$1 20 per 100 pounds.

The rate of \$2 35½ is the maximum rate charged upon anything. It is applied only upon such articles as bandboxes, baskets, batting, bird cages, boats, empty churns, empty barrels and casks, fruit boxes and trays, feathers, fireworks, etc.—articles that are extremely bulky, displacing from four to ten times the space occupied by the same weight of ordinary merchandise; or articles which are extremely hazardous, such as coal oil or gunpowder, in small quantities, liable to injure the train, damage the cars, or damage other freight when loaded in the same car, or which require special cars or special attention in order to handle, etc. These articles number, as you well know, scarcely more than one hundred out of the multitudes of articles of human production and consumption which makes the sum of traffic of a railroad company. Their amount is infinitesimal in proportion to the tonnage of the road, not equaling, I venture to assert, one hundredth of one per cent. of the whole. If they were all taken at first class rates, the reduced rates could have no appreciable influence upon the prosperity of any community or individual. The same is true of the articles which are taken at the lower rate of \$1 80 per 100 pounds, being such as are rated in the railroad parlance at one and one-half times first class. They are so rated for reasons similar to those given in the explanation of the maximum rates. The list contains such articles as thrashers, steam boilers, brooms, children's cabs and wagons knocked down, china baskets, copper vessels, unless they are nested and packed, drygoods, when packed in bales, which, by being so packed, are extremely susceptible of damage by chafing or leaking of liquids in the same car, some kinds of empty packages, hats and caps, shrubbery in bundles, and drain tiling in less than carloads. I think that one twentieth of one per cent. would be a very liberal estimate of the relation they would bear to the whole tonnage. Respecting these rates, if there is taken into consideration the displacement of space, the liability of damage to the article itself, or its liability to damage other articles loaded near it, its value, and the risk in handling it, and all the other elements proper to be considered in rating freight, they will be found to be the lowest charged by this or any railroad company.

The legal restriction of 15 cents per ton per mile makes it impossible for the railroad company to fix a fair charge for the transportation of some of the articles included in the class above referred to.

This complaint also states that the charges between San Francisco and Los Angeles are but 10 cents, 6 cents, and 7 cents per 100 pounds on first, second, and third classes, respectively, greater than the charges from San Francisco to Sumner. The statement is partially incorrect, as the real difference is 10 cents, 8 cents, and 7 cents, respectively. The smallness of the difference is adduced as evidence of unjust discrimination in favor of Los Angeles and against the citizens of Kern County. I am unable to view the matter in the same light, and I think it will be difficult to justify the views of the gentleman making the charge before any thoughtful or unprejudiced Judge or jury.

Before the Southern Pacific Railroad was built, Kern County was dependent upon wagons and stages for its means of transportation, at a cost of which the tariffs of the railroad company are but a frac-

tion. Its lands were chiefly devoted to grazing. At the same time Los Angeles County was served by sailing craft and regular lines of steamships, at rates which, it is reported, were seldom greater than the same class of carriers now charge. The interests of the county were diverse—fruit, cereals, cattle, and sheep were abundantly produced, and the chief city of the county was the center of trade for the southern portion of the State. That which this complaint terms discrimination, *i. e.*, the difference in the cost of transportation to and from Kern and Los Angeles Counties, respectively, certainly subsisted at that time. Did the railroad company create it? Did it increase it? How is it with Kern County now? The railroad has been built, cost of transportation of supplies has been largely reduced, land has not only trebled and quadrupled in value, but values have been created where none before existed. Agriculture has not only become possible, but profitable, for the people have secured the "open sesame" to all the world's markets, and this, too, without a dollar's expense to a citizen of the county. How is it with Los Angeles County? It has received the same railroad facilities, in addition to its other natural advantages, but has been deprived of the same relative benefits (the cheapening of the cost of marketing its produce and receiving its supplies) by law. Here is a *discrimination*, indeed. The railroad company is allowed to decrease the cost of freight for the Kern County citizens, but restrained, by law, from doing the same thing for the citizens of Los Angeles County. The hardship is twofold, but does not affect, except indirectly or remotely, a single citizen of or interest in Kern County; but it does affect the railroad company by compelling it to forego a large portion of the traffic interchanged by Los Angeles County and the City of San Francisco, which it might engage in at a very little additional expense. And it affects the citizen of Los Angeles County by depriving him of the benefits of competition which the natural advantages of location, near the sea, would promote, were its transportation interests left to the control of commerce and trade.

The railroad company maintains that its rates between San Francisco and Sumner are reasonable, and I think you will agree with me, that neither this complaint nor any of its fellows advocates anything worthy of evidence or argument to the contrary. There is not only utter barrenness of facts or logic in the complaint, illustrations of the alleged unfairness and injustice of carrying freight between San Francisco and Los Angeles for the slight advance over the rates between San Francisco and Sumner, but I dare assert that the knowledge and experience of the author of each and every complaint before me, is equally barren of an example wherein his or his neighbor's interest has been injured or retarded by the practice. Again, according to this complaint, the rate of \$5 50 per ton charged from Sumner to San Francisco for wheat, "leaves the producer no adequate margin of profit to encourage its production."

The Kern County farmer can deliver his wheat at ship's side for \$5 per ton. For years wheat has been and is now being produced in this State and marketed in Europe which has cost the producer \$6 per ton to deliver at ship's tackle in San Francisco harbor, and the wheat production has and is steadily increasing. I have known it to be produced even in Arizona and Utah and marketed in San Francisco at rates considerably above those complained of. The very fact that California produces, and markets in Europe,

against the local producer, from 600,000 to 1,000,000 tons of wheat annually is sufficient answer to this specification.

#### COMPLAINT No. 4,

Is that the rate on potatoes from Tulare to Sumner is so high that the shippers cannot make a living profit on his goods. Potatoes are rated by this company with wheat, for which a very low rate is provided when going to the general market, but when moved short distances, or in the other direction, *i. e.*, away from the general markets, it is rated second class. Now, while I don't attach much importance to the statement in estimating the relative fairness or reasonableness of the rates, yet just to show how the arguments of these complaining gentlemen may be turned against themselves, I beg to state that the tariffs of the Illinois railroads, governed by the laws of that State, provide a higher rate for second class freight moved like distances. For example: for sixty miles the second class rate of the Chicago and Burlington and Quincy Railroad is 34 cents per 100 pounds; that of the Chicago and Alton Railroad is 37½ cents per 100 pounds; while this company's second class rate, Tulare to Sumner, 63 miles, is but 31½ cents per 100 pounds. I am unable to discover any evidence of extortion upon the part of this company by that comparison, which is certainly the very method chosen by the complaining parties whereby to test the traffic of the Central Pacific Railroad Company. But this complainant says that, on account of the charges of this company, he cannot make a living profit on his goods, and the same assertion runs monotonously through all the complaints. Respecting it, I beg to submit that, to entitle such a complaint to the patient hearing of the honorable Board of Railroad Commissioners, it ought to be accompanied by evidence of what is or may be considered a "*living profit*," and proof that such a profit was not secured from the transactions or transaction referred to, and that the failure to gain it was or is wholly chargeable to the fact that transportation charges were more than a certain sum conceded by all to be reasonable. As the general complaint under notice consists of mere unsupported assertions, I venture to meet it with an assertion which I think you will indorse, and that will commend itself to any reflecting man who will consider it for a moment, namely: that if a just estimate be taken of the expenditure, of brain power, physical labor, skill, capital, experience, and the risk involved in the transaction, in fact everything which contributes to the value of a service, it will be conceded that the service of the carrier in hauling the car of potatoes—Tulare to Sumner—is by far the cheapest rendered by anybody, from the producer to the merchant who distributes to the consumer. And the percentage of profit upon the investment of capital, skill, and labor, made in the transaction referred to by the merchant who makes this complaint, was very many times that realized by the carrier, and that this is equally true of every case in the complaints before me. I venture to say further, that proper inquiry will reveal the fact that the merchants and dealers of the Town of Bakersfield, as a rule, make a larger percentage of profit than those of the same class doing business in less remote districts, or at points served by competing carriers, which enjoy lower rates of freight. It is idle to say that the merchant's profits depend in any degree upon the freight

rates. If dependent at all, it is upon this rule only: that the higher the freight rates, the greater the profit of the merchant.

### COMPLAINT No. 6,

Alleges, as a special cause for complaint, that the rate on wool from Poso is or was one hundred and fifty-five (\$155) dollars per carload; that this rate is exorbitant and unfair, because the rate is no greater from Los Angeles to San Francisco, although Los Angeles is one hundred and eighty-eight (188) miles further off. The fact is the rate on wool from Poso to San Francisco is but sixty (60) cents per 100 pounds, no matter what quantity is shipped. The rate per ton would, therefore, depend altogether upon the quantity loaded to the car. If that should be 20,000 pounds, which is considered the minimum capacity of the car, the carload rate would be but one hundred and twenty (\$120) dollars. The ground of the complaint in this case is evidently the view of its author, that the relative rates from Poso and Los Angeles should be in proportion to the length of each haul, and because it is not so terms "it an unjust discrimination *in favor of Los Angeles and against the inhabitants of Poso and Kern County.*" In noticing Complaint No. 2, I have covered this point of unjust discrimination, but wish here to ask, in what way is any wool grower of Kern County injured, or how are his material interests affected in the least by the fact that the citizen of Los Angeles County can forward his wool to the general market at no greater cost? There is no competition between the counties in this product. Neither one produces more than the other, or a better quality than the other, and does not affect the price secured. The wool is all marketed in the Atlantic States. The demand is more than all California can supply, and the price is governed, not by the size of the clip in this State, but by prices in London, and the relation of the supply to the demand from all sources. What the author of this complaint desires is, that rates from Poso and Kern County shall be the same *per mile* as from Los Angeles. Another of the complainants goes further—urges that the rates to Sumner should be the same proportionately—that is, in proportion to distance as to Arizona—and the same principle, that rates should be uniform for all distances, would require rates to and from Sumner or Poso to be the same per mile as to and from New York and San Francisco. These gentlemen seem to be utterly oblivious to the common principle of trade, that a large business can be handled at a lower rate per mile of service than a small one. As a man can and will work for less per day under contract guaranteeing him constant employment for a long term than he can or will if employed by the day, or as a farmer can cultivate a section of land at a less cost per acre than he can twenty acres, or as a merchant can afford to sell a million dollars worth of goods per annum at a lower percentage of profit than he can if he but handled fifty thousand dollars worth of goods; so a railroad company having *miles of transportation service to sell*, can sell a thousand miles at a lower rate per mile than three hundred. Again, competition of markets and of other carriers as factors in transportation seem to have been entirely ignored. This company and its eastern connections are now, and have been for more than a year, carrying barley to Chicago for twenty (\$20) dollars per ton, which is

less than one cent per ton per mile. To charge a higher rate would absolutely exclude the California barley from competition with that grown in the Eastern States and Canadas. By taking it, the railroads increase their expense but a trifle over and above the cost of operating them without this tonnage, and they open a market for a California product which could not be placed at any other point. Now, are not both the public of California directly, and this company indirectly—by the promotion of home industries if not directly—benefited by this extremely low rate? What would be the result if any competent power required rates to intermediate points to be the same per mile? Nothing less than the abandonment of the Chicago business, *i. e.*, the rates, too, would have to be advanced so as to exclude California grain from that market, and the producer of California would be the sufferer. The effect would be the same in a case of competition between carriers. Take, for example, the business between Los Angeles and San Francisco. The desire of the complainants can be accomplished in two ways only, namely: by advancing rates to and from Los Angeles to the same rate per mile as the rates between San Francisco and Sumner or Poso, or by reducing the latter to the scale of the former. If the first plan were adopted, Los Angeles would ship her wool by sea, which, while damaging the railroad and making it much more difficult for its managers to reduce rates to intermediate points, would not benefit Kern County. In fact it would injure it by postponing the day when the tariff upon its products could fairly be modified, or even perhaps necessitate an advance in its freights, in order to continue profitable operation of the road.

The effect of the railroad regulation in the new Constitution has been precisely as described above. The railroad company was compelled to advance the Los Angeles rates on all general merchandise, and has consequently lost the traffic. The suggestions of these complaints would force to the sea all the trade of that section that is left to the railroad. Were the second plan adopted, it would have to be by some such regulation as this:

*First*—The railroad company must make rates to competing points as low as other carriers.

*Second*—The rates to points intermediate must not be greater per mile than to the competing point.

This I am sure you will excuse me from commenting upon, especially as the State, or its officers the honorable Commissioners, has and can exercise no authority over all the competitors of this company. The railroad company simply could not and would not be operated.

#### COMPLAINT No. 7,

Alleges, for special cause of complaint, that upon offering four mules for shipment, Sumner to Modesto, the complainant was told that the rate would be \$20 each, or \$80 for the four. Upon further inquiry he learned he could ship one mule for \$20, two for \$30, three for \$36, four for \$48, and a carload for \$44. Complainant avers that this method of rating discriminates against the poor, in favor of the rich man. The rates from Sumner to Modesto on horses, mules, and cattle, are for one head \$19 80, two \$33 65, three \$44, and a carload \$44. In no case is there a greater charge made for a lesser than for a greater quantity in the same car. The rates for carloads are fixed

with reference to cattle and sheep, though they are applied on horses and mules as well. The carload rates might fairly be greater, but cannot be made so without driving business from the road. The rate for a single head is the same as that for a ton of freight, for two head the same as for a ton and three quarters of ordinary freight, for three head the same as for two and one half tons of ordinary freight, and for every additional head the same as for one half a ton of freight, except it is stipulated that in no case shall the charge for less than a carload be greater than for a full carload. You are well aware that while the charge for a single head may seem out of proportion to the charge for a carload, yet the disproportion disappears with acquaintance for the reasons for the difference. A horse, mule, or cow will certainly occupy a great deal more space in a car than a ton of freight, and if from four to five are placed in one car they practically occupy the whole car—that is to say, the car is not available for any other freight. The shipment was made June eighth, and the mules occupied the entire car, so that while the shippers had the privilege of shipping sixteen, at the same cost, and only shipped four, the railroad company performed the same service that they would have performed had the car contained sixteen mules. The complainant suggests that the railroad company be compelled to carry mules, whenever there are four or more in the same train, no matter if consigned to four different persons, and charge no more for each mule than in proportion to the carload rate—that is to say, one sixteenth ( $\frac{1}{16}$ ) of the carload rate for each mule. If such a method of rating mules was reasonable and just, to apply it to the rating of all other animals and freight as well—that is to say, the rate of charge for one sheep should be one ninetieth ( $\frac{1}{90}$ ) of carload rates, for a hog one seventieth ( $\frac{1}{70}$ ) of a carload rate, and for each lot of 100 pounds of freight one twentieth ( $\frac{1}{20}$ ) of the rate per ton. The suggestion is so absurd and impracticable that further comments are unnecessary.

#### COMPLAINT No. 9,

Complains first, because the railroad company will not furnish cars containing two decks for the transportation of sheep; and second, that the charge for a carload of sheep—that is a single deck car—is as much as it should be for a double deck car. Double decked cars are not furnished, for the following reasons: they would be wholly useless for all kinds of freight, excepting sheep and hogs; and as the business of the company in the transportation of this kind of freight is limited not only in quantity, but to certain seasons of the year, the cars would be idle at least half the time. If this were not the case, the shipment of live stock is as a rule altogether in one direction—that is towards San Francisco—and as the cars would not be available for any other class of freight, they would have to be sent to a shipping point empty, hence requiring the car to double the road in order to transport one carload of stock to this market. It is, therefore, evident that whatever might be considered a reasonable rate for a carload of sheep in a car, but with one deck, that double that rate would not compensate the railroad company were it required to furnish double deck cars and haul double the number of sheep per car. The rate for single deck cars being from Sumner to San Francisco fifty-three dollars and sixty cents (\$53 60), or 20 per cent. lower than the

same cars would earn if cattle were loaded in it. I think there can be no doubt that it is reasonable.

#### COMPLAINT No. 10,

Alleges that the present rate of \$1 20 on comb honey and 55 cents on extracted honey—the rates named being for 100 pounds—reduce the profits of complainant to an extent that will not admit of its further production.

Regarding this, permit me to state, that honey is produced in California, shipped over the railroad of this company, thence shipped by rail across the continent, and marketed in the Eastern States against the honey produced there, and is even exported to and sold in Europe with honey produced in European countries. No other comment seems to be necessary.

#### COMPLAINT No. 11,

Is specific, and alleges that the rates on wines and liquors from San Francisco to Sumner, are exorbitant, because the rates on whisky from Illinois and Kentucky to Sacramento and Stockton are lower per mile than the rates from San Francisco to Sumner. The particular grievance of the complainant is, that those rates deprive him of a large portion of the earnings and profits which he should rightfully derive from his business. The rates on whiskies from the East are very low, and are made so simply because low rates are necessary to compete with vessels following the Cape Horn route, which brings to this port by far the larger proportion of the whisky imported. It is not reasonable to suppose that the entire traffic of this railroad company, or any railroad company, can be done upon the basis of low rates, made necessary for the through business, taken in competition with other carriers, nor that the railroad companies should undertake to place interior towns upon a footing with respect to transportation charges with San Francisco and other places located at competitive points. The ground of this complaint has been covered in previous remarks.

#### COMPLAINT No. 12,

Is, for the most part, same as No. 9; that is, that double deck cars are not furnished for sheep at Fresno at same rates charged for single decks. It is not necessary to notice this, except that complainant avers that it is practicable to provide a movable upper deck, which would remove the difficulties in the way of providing cars with two fixed decks.

The answer to this is, that the experiment of movable decks has been tried by railroad companies and rejected as a failure, so that railroad companies who have a large stock business so distributed over their line that double decked cars can be furnished with economy, prefer and use fixed decks. Another specification of this complaint is, that the rate for wool from Fresno to San Francisco is \$100 per car, while wheat is taken for \$48 50, and complainant can see no reason or justice in such wide discrimination.

With respect to this, it is submitted that the rate on wool is not unreasonable, and that the rate for wheat is very low, and, while the latter is very much lower than the former, that the relation which the two articles bear to the whole tonnage of the State, their relative



value and industries upon which the prosperity of the State depends—the cost of production—and the price obtained for them at the general market, are sufficient to justify the difference. Classification of freight is necessary. If it were possible to make an average rate per ton to be charged for all classes of freight, regardless of their value, or weight and measurement, their liability to damage, or to damage other freight, etc., the question of freight tariff would be a very simple one. Carriers would be very eager, for the purpose of economy and profit, to adopt it.

The wisdom, and it may be said the necessity, of making differential rates, is apparent. To charge the same rate per ton on all classes of freight as is charged upon wheat, would require the rates on grain to be advanced, so as to absolutely prohibit production, except in localities adjacent to the general markets, or the freight on all other articles to be reduced to the level of wheat, which would plainly make profitable pursuit of the transportation business impossible. No further argument upon this point seems to be necessary, although it will be noted that the complainant does not aver that the wool rate is too high by itself considered, but that it is relatively high when compared with the rate on wheat. Complainant feels that he has another grievance by reason of having been charged \$7 06 more for hauling a car of goats from Fresno to Fowler, which the company hauled under contract with him from Niles to Fresno for \$38 40, and avers that the goats were not taken from the car at Fresno, nor the car taken from the train, but they were simply forwarded nine and a half miles further. Had he directed the goats to be shipped from Niles to Fowler, the service would have been performed for him for \$40. Instead, however, he contracted they should be shipped to Fresno, and, after arriving there, he desired them to be forwarded to Fowler. This required a new contract for the extra service, and another way-bill to be made out. The agent of the company could not do otherwise than to bill them at his rates from Fresno to Fowler, as the company does not and cannot make tariffs and rules which will provide for peculiar and exceptional cases, as the one which gives rise to this complaint. Had the shipper given notice to the general office, even after the goats had been shipped from Niles, and desired to have the destination changed to Fowler, the change could have been made, and he receive the benefits of the rate of \$40 from Niles to Fowler. But this would have required some telegraphing, the actual cost of which would perhaps have equaled, if not exceeded, the difference in the rate to be paid. This complaint appears to be very trivial. Complainant also thinks that the rate of \$10 per carload on wool from Fowler to Fresno is too high. It is my opinion that a car cannot be moved any distance, with profit, for less than \$10, although the legal maximum rate of 15 cents per ton per mile, established by the law incorporating the company, imposes upon it the necessity of removing cars short distances for a lower rate.

#### COMPLAINT No. 13,

Alleges that the rate on alfalfa seed from Sumner to San Francisco is \$180 per car; that it discourages production, as it will subject the producer to a loss of about \$246 per carload. Accordingly, if the car were consigned to San Francisco, free of charge, the producer would

still be loser in the sum of \$66 50. But permit me to go farther into the complaint, in which the following is given as the approximate cost of producing and marketing alfalfa seed:

Cost of mowing, per acre .....	\$1 00
Hauling, stacking, etc., per acre .....	3 00
Thrashing and reclaiming, \$78 per day, 3,000 pounds per day on the yield of 30 acres, per acre .....	2 60
Sacking and hauling to cars, one half cent per pound .....	50
Freight (?) .....	90
Total .....	\$8 00

The yield per acre is given as one hundred (100) pounds, hence the cost of 100 pounds would be \$8. The freight, however, is but 55 cents per 100 pounds, instead of 90 cents, as charged in the complaint, which would reduce the cost laid down in San Francisco, to \$7 65 per 100 pounds.

The Alta, of December 2d, quotes the price of alfalfa seed at from 12 cents to 13 cents per pound, or from \$12 to \$13 per 100 pounds, and I know of a carload from Utah, paying a much higher freight, having been placed in the market for 11½ cents per pound.

The fact is, then, that instead of being marketed at a loss of \$246 per carload, alfalfa seed can be produced in Kern County, and marketed in San Francisco, at a profit of from \$4 35 to \$5 35 per 100 pounds, or \$870 to \$1,070 per carload. The complaint under notice also alleges the rate for wheat to be \$60 per carload—it is but \$55 per carload of ten tons—and reasons that that is sufficient to prove the unfairness of the rate on alfalfa seed. Permit me to test the logic, and at the same time to illustrate the wisdom of differential rates, or of classifying freights. In 1878 a committee of prominent farmers, residing in Fresno and Tulare Counties, submitted to me an estimate of the cost of producing and delivering wheat to the cars. I have that estimate, and can give the names of the farmers, and produce their certificate to verify the figures. You will doubtless agree with me, that they may be fairly applied to Kern as well as Tulare and Fresno Counties. The estimate places the average yield at 20 bushels, or 1,200 pounds per acre, and the cost of production 67½ cents per bushel, or \$1 12½ cents per 100 pounds; that is, the total cost of producing wheat from an acre of ground is \$13 50; add to this 27½ cents per 100 pounds for freight, or \$3 50 for 1,200 pounds, and the cost of producing and delivering in San Francisco the produce of one acre sown to wheat is \$16 80. The outside quotation of wheat in San Francisco is \$1 55 per 100 pounds, or for 1,200 pounds (making the gross return per acre) \$18 60, the net profit of \$1 80 per acre. While I have shown above the net profit from the product of an acre of alfalfa is, from the seed alone, from \$4 35 to \$5 35—and yet I understand the alfalfa seed is only a bi-product—that the acre yielding 100 pounds of seed has also yielded seven tons of hay. I hope those who have talked without knowledge against this company's tariff will drop their favorite illustration of alfalfa seed.

#### COMPLAINT No. 14,

In this: it is presented that the public should not be charged ten (10) cents for the State toll for every small bill of goods, but charged only at the rate of 10 cents per ton. With respect to this, the com-

pany charges the regular rate, the same that the shipper would have to pay were he to ship his goods by sea-going vessels, in which event toll will be included in his cartage charges paid by the drayman. The money collected by the company for State toll is collected for the State, and turned over to the proper authorities. Complainant alleges that some time in May he shipped a lot of shelving and counters; that he wanted to ship them on flat cars, etc., but the company would not consent, and he was charged the highest rate per 100 pounds, to wit: \$2 26½, the total charge, according to his recollection, \$492. There was no such shipment made by complainant in May of 1880. The shipment he refers to are undoubtedly those made in 1878. One carload, containing 15,150 pounds fine counters, showcases, etc., was taken at the rate of \$1 33½ per 100 pounds, instead of \$2 26½, as alleged by shipper. And another carload, for which the freight was estimated—a car containing less, perhaps, than 10,000 pounds—was taken for \$120. The total charges, instead of being nearly \$500 as stated by shipper, were \$322. The same complainant thinks that a charge of \$1 80 per 100 pounds for drygoods, shipped in bales, when the same goods can be shipped in cases for \$1 20, ought not to be allowed. I have explained above the reasons for rating baled goods higher than cased goods. A reasonable regard for the carrier's interests requires that goods shall be put up in safe and sufficient packages in order to protect them from damage. The carrier may legally decline to receive goods in insufficient packages, but as in this case with us, as a matter of accommodation to shippers, sometimes accept the defective packages in consideration of a higher rate, to compensate for the higher risk. Even then the shipper has the option of casing his goods or baling them, paying in the latter case the higher rate. If he prefers to ship in bales at \$1 80, it is evident that it is more economical for him to pay that rate, than to pack in cases at \$1 20 per 100 pounds, but there is no reason why he should exercise this economy at the risk and damage of the railroad company. He also thinks that a merchant or farmer having miscellaneous goods, ought to be allowed to load a car by paying carload rates as established. What he means by carload rates, as established, is not clearly understood. Whether he means carload rates on grain, or live stock, or other articles. This gentleman's ideas of freight tariff differ very materially, you will observe, from those of the gentleman making Complaint No. 7. The latter thinks that a carload rate, which is lower than the rate for small quantities, is a discrimination in favor of the rich against the poor, and protests against it, while Mr. Galtes evidently thinks there is not enough of that kind of discrimination going on. This remark is made respectfully, and simply to mark the prevailing difference of opinion as to what would be the correct principle to govern transportation charges. It illustrates that as long as we have different degrees of knowledge and experience among men, there will be difference of opinion. In view of which, it seems to me that the officers of this company may feel gratified over the result of the inquiry instituted by the Railroad Commissioners, not only as to the nature, but as to the number of the complaints filed.

Respectfully submitted.

(Signed)

J. C. STUBBS, General Freight Agent.

CENTRAL PACIFIC RAILROAD COMPANY,  
 GENERAL SUPERINTENDENT'S OFFICE,  
 SAN FRANCISCO, January 5, 1881. }

*To the honorable Board of Railroad Commissioners:*

GENTLEMEN: Your memorandum of interrogations for 1879 and 1880, relative to the business of the Central Pacific Railroad and leased lines in California, at the hands of your Secretary, Mr. Andrus, was received December 8th.

As the interrogatories for both years are substantially identical, I will treat of 1880 only. You ask:

*First*—What is the amount of gross earnings of 1880 to your latest returns? State monthly.

*Second*—How much of above amount was earned in California? State total.

*Third*—How much of the earnings over the operating expenses? State total.

*Fourth*—How much earned on local passengers? How much earned on local freight?

*Fifth*—How much earned on passengers taking passage in California for points outside?

*Sixth*—How much earned on freights shipped from points in California to points outside?

These six interrogatories I would answer as a whole, and say that our accounts are not kept so that we can segregate California business from the other upon the line, so as to be able to give you the desired information. Your interrogatory relative to the number of trains run daily, is nearly as difficult to answer as the others; however, I have counted up, and give you herewith, the number of regular passenger trains and regular mixed, or accommodation trains, as per schedule for the present month; but this will give you little or no information of value, from the fact that there are special or excursion trains run when business requires, which are not embraced in the following. Then again, nearly all the regular freight trains have a car attached for the accommodation of passengers locally through the State.

## DAILY, BETWEEN STATIONS EACH WAY.

	Regular Passen- ger Trains	Fixed or Accom- modation
San Francisco and Niles	4	1
Niles and Livermore	2	1
Livermore and Tracy	1	---
Tracy and Galt	2	2
Galt and Sacramento	1	2
Niles and San José	1	3
San Francisco and Port Costa	5	5
Port Costa and Davis	3	---
Port Costa and Antioch	3	2
Antioch and Byron	2	2
Byron and Tracy	1	2
Davis and Sacramento	5	---
Davis and Willows	1	1
Davis and Woodland	2	1
Davis and Knight's Landing	1	---
Vallejo and Calistoga	2	---
Vallejo and Napa Junction	4	---
Vallejo and Suisun	2	---
Sacramento and Roseville	3	2
Roseville and Redding	1	1
Roseville and Reno	2	1
Galt and Ione	---	1
Lathrop and Goshen	1	1
Goshen and Los Angeles	1	1
Goshen and Huron	---	1
Los Angeles and Arizona	---	3
Los Angeles and Wilmington	---	2
Los Angeles and Santa Ana	---	1
Los Angeles and Santa Monica	---	1
San Francisco and Oakland	29	---
San Francisco and East Oakland	20	---
San Francisco and Alameda	26	---
San Francisco and Berkeley	12	---
San Francisco and West Berkeley	10	---
San Francisco and Shell Mound	22	---

To your interrogatory No. 7, you ask us to "state the number of passengers carried in this State in 1880, to your latest returns, on the Central Pacific Railroad and leased lines, from and to stations on different sections of the road, so as to show the volume of travel on distinct portions of the road."

This information is nearly as difficult to obtain and give you in an intelligible form as that asked for in the first six interrogatories; but feeling desirous of doing all we could to get for you the information wanted, we at once, on receipt of your memorandum on the eighth ultimo, placed a large corps of clerks upon this work, and herewith hand you the result.

To the casual observer it would seem to be but the work of an hour; but you will notice here are 289 stations on the Central Pacific Railroad and leased lines in California, requiring ten sheets of foolscap, double ruled, to each station, showing the number of passengers carried, and average number per day, requiring 120 entries to each sheet. You will also observe there are sixty distinctions to each sheet, and in the aggregate 2,890 sheets.

You ask for this information for the year 1879, and for that portion

of 1880 up to and including our latest returns; but I am sure, when you have seen the great number of printed forms necessary to accomplish this work, and consider the labor put forth, you will, I think, be satisfied with the showing for one month, namely: September, 1880, having the largest passenger business. Every station report will be eyeleted together—ten sheets. I also send you herewith 11 sheets, eyeleted together, showing a recapitulation of passengers carried from any one station to all the others, and to any one station from all others, and showing the total number and average per day. Upon looking the recapitulation over more carefully, we have made a further synopsis, showing that there were *forty-six* stations from which there were no passengers carried:

Eight from which the daily average was .....	1
Nine from which the daily average was .....	30
Six from which the daily average was .....	15
Seven from which the daily average was .....	10
Three from which the daily average was .....	15
Three from which the daily average was .....	1
Three from which the daily average was .....	1
Three from which the daily average was .....	30
Two from which the daily average was .....	15
Five from which the daily average was .....	10
Three from which the daily average was .....	1
Three from which the daily average was .....	11
Two from which the daily average was .....	10
One from which the daily average was .....	30
Three from which the daily average was .....	15
Four from which the daily average was .....	2

There were also 40 stations to which there were no tickets sold, and there were:

Fourteen to which the daily average was .....	1
Eleven to which the daily average was .....	30
Eight to which the daily average was .....	15
Four to which the daily average was .....	10
One to which the daily average was .....	15
Six to which the daily average was .....	1
Three to which the daily average was .....	2
Two to which the daily average was .....	30
One to which the daily average was .....	15
Six to which the daily average was .....	10
One to which the daily average was .....	1
Three to which the daily average was .....	11
Two to which the daily average was .....	30
Three to which the daily average was .....	10
Four to which the daily average was .....	15
	2

This list might be continued, showing very many more stations that did not average one passenger a day either to or from.

Trusting the information we give you here may be of interest and entirely satisfactory, I am yours truly,

(Signed)

A. N. TOWNE,  
General Superintendent.

IN THE CIRCUIT COURT OF THE UNITED STATES, IN AND FOR THE DISTRICT OF CALIFORNIA.

*The Pacific Coast Steamship Company vs. The Board of Railroad Commissioners of the State of California.*

*To the Judges of the Circuit Court of the United States for the District of California:*

The Pacific Coast Steamship Company, a corporation of the State of California, brings this, its bill against The Board of Railroad Commissioners of the State of California, and thereupon your orator complains and says:

*First*—That George Stoneman, Joseph S. Cone, and C. J. Beerstecher, are the duly elected and qualified Railroad Commissioners of the said State, and constitute the Board of Railroad Commissioners of the State of California.

*Second*—The Pacific Coast Steamship Company is, and ever since the thirtieth day of September, one thousand eight hundred and seventy-six, has been a corporation, duly organized and existing under and by virtue of the laws of the said State of California, for the transaction of the business of a steamship company on the Pacific Coast, and in any of the bays or harbors thereof, and anywhere in the Pacific Ocean.

*Third*—The said steamship company owns a large number of steamships, which are actually engaged in the coasting trade, and make voyages therein along the Pacific Coast from San Francisco, in California, to Portland and Astoria, in Oregon, and to ports on Puget Sound, Washington Territory, and to ports in British Columbia, in the Dominion of Canada, and from said San Francisco to San Diego, in California, touching at many and divers way ports on the said coast of California. All of the said steamships, in making their said voyages, navigate the Pacific Ocean more than a marine league from the shore.

*Fourth*—The said steamships carry goods sent from cities in States east of the Rocky Mountains, upon through bills of lading across the continent by rail to San Francisco, some of which are at the latter port transferred to said steamships in the original unopened packages, and thence carried by them to ports of destination, in the said States of California and Oregon, Washington Territory, and British Columbia. Some of the merchandise transported by the said company consists of goods imported from other States, and from foreign countries, but which have been opened in this State, and are not in the original package. Passengers with through tickets, and also passengers without through tickets, for Texas, Arizona, and New Mexico, go to San Pedro, in California, upon said steamships, thence by rail and stage to and through Arizona and New Mexico to Texas. Passengers with through tickets from Europe, for British Columbia, Washington Territory, and Oregon, are carried from San Francisco by the said company's steamships to their ports of destination. Passengers are also transported on the said steamships from different ports within the State of California to other ports within the said State. Freight and merchandise is also shipped and carried on board of said steamers from ports in California to other ports in Cali-

fornia, some of which freight consists of indigenous products and merchandise domestic to the State of California. Freight and merchandise is also shipped and carried on board of said steamers from southern ports in California to ports in Oregon and British Columbia, and to cities in States east of the Rocky Mountains, upon through bills of lading. That all of said steamships are enrolled and licensed to carry on the coasting trade by the Government of the United States, and are carrying on the said coasting trade under and by virtue of the said enrollment and license, and the Acts of Congress governing and regulating the said trade.

*Fifth*—The Board of Railroad Commissioners claim that, under and by virtue of powers vested in them by the Constitution and laws of the said State of California, they have the power, and it is their duty :

1. To establish rates of charges for the transportation of passengers and freight carried by the said steamships.

2. To examine the books, records, and papers of the said steamship company.

3. To hear and determine complaints against the said company, and to punish the said company for contempt of their orders and processes, and to enforce their decisions.

4. To prescribe a uniform system of accounts to be kept by the said corporation.

And the said defendant threatens to and will establish the said rates of charge for the transportation of passengers and freight carried by the said steamships; and threatens to and will examine the said books, records, and papers of the said steamship company, and hear and determine complaints against the said company, and punish said company for contempt and disobedience of the orders and processes of the said defendants, and enforce their decisions; and threaten to and will prescribe a uniform system of accounts to be kept by the said corporation, unless restrained and enjoined by this honorable Court.

That by so enforcing and carrying out the said threats, the said defendant will cause to your orator great and irreparable damage, and will cause and create against your said orator a multiplicity of suits.

Wherefore, your orator prays for an injunction of this honorable Court, enjoining and restraining the said defendant from doing or performing any of the acts so threatened as hereinbefore fully set out; and for such other and further order and relief as to equity shall seem just.

And your orator further prays that a writ of subpoena issue herein, directed to the said defendant, commanding it to appear and show cause, if any it has, why the prayer of your orator should not be granted.

JOS. P. HOGE, AND  
 ROCHE & DESBECK,  
 Solicitors for Plaintiff.



IN THE CIRCUIT COURT OF THE UNITED STATES, IN AND FOR THE  
DISTRICT OF CALIFORNIA.

*The Pacific Coast Steamship Company vs. the Board of Railroad Commissioners of the State of California.*

Now comes the defendant in the above entitled action, and makes answer to plaintiff's complaint, as follows:

*First*—The defendant admits the allegations set forth in the first and second subdivisions of said complaint.

*Second*—The defendant admits that the plaintiff owns a large number of steamships—to wit, seventeen—which are actually engaged in the coasting trade, and make voyages therein along the coast of California; but alleges, upon information and belief, that only four of said steamships make voyages from any port in the State of California to any port outside thereof.

*Third*—The defendant admits that plaintiff's steamships carry goods brought to San Francisco on through bills of lading from points outside of the State of California, some of which are, at said port of San Francisco, transferred to said steamships in the original package, and some after the original package has been opened, and thence carried by said steamships to ports and points within the State of California, and to ports and points outside thereof, as stated in subdivision four of said complaint. But in respect thereof, further answers that the freight thus carried by plaintiff, or the larger portion thereof, comes to the port of San Francisco, and no farther, on said through bill of lading, and is thence shipped by its owners, agents, or consignees, on board of plaintiff's steamships, some of which is consigned to points within the State of California, and some to points without. Admits that passengers with through tickets, and passengers without through tickets, go upon plaintiff's steamships to San Pedro, in the State of California, thence by rail and by stage to Arizona, New Mexico, and Texas; but in respect thereof, alleges that such passengers, or a large portion of them, travel on plaintiff's steamships to San Pedro, and other points within the State of California, irrespective of their destination outside of the State, just as passengers whose destination is some point within the State. Admits that freight is shipped on board of and carried by plaintiff's steamships from southern ports in California to ports in Oregon and British Columbia, and to cities east of the Rocky Mountains, on through bills of lading. Admits that all of plaintiff's steamships are enrolled and licensed, as set forth in subdivision four of the complaint herein. Admits generally the allegations of subdivision four of the complaint; but alleges, in respect thereto, that the main business of plaintiff's steamships—that is to say, more than one half of it, consists of the transportation of freight and passengers from port to port within the State of California; that such freight is composed principally of the produce and manufactures and goods of the citizens and inhabitants of the State of California consigned to citizens and inhabitants of the State of California; and that such passengers are citizens and inhabitants of the State of California, traveling from port to port within said State, on business, or for health or pleasure.

*Fourth*—The defendant admits that under and by virtue of the

powers vested in it by the Constitution and laws of the State of California, it claims to have the power, and it is its duty:

1. To establish maximum rates of charges for the transportation of passengers and freight carried by plaintiff on its steamships, and by all other transportation companies within the State, from all the ports to all the ports within the State of California.

2. To examine the books, records, and papers of plaintiff.

3. To hear and determine complaints against the plaintiff, and to punish it for contempt of the orders and processes of defendant, and to enforce its decisions.

4. To prescribe a uniform system of accounts to be kept by plaintiff.

*Fifth*—And the said defendant admits that it threatens to, and will, unless legally restrained therefrom, establish maximum rates of charges for the transportation of passengers and freight carried by plaintiff, and all other transportation companies within this State, from ports within said State, to ports within said State; but denies that it will or intends to establish rates of charges for the transportation of passengers or freight carried by said steamships, or any other transportation companies, from ports within said State to ports within the same; and denies that it will or intends to establish rates of charges for the transportation of passengers or freight carried by said steamships, or any other transportation company, from points without the said State to points within the same; admits that it threatens to and will examine the books, records, and papers of plaintiff; will hear and determine complaints against it; will punish it for contempt and disobedience of the orders of this defendant; will enforce its decisions, and will prescribe a uniform system of accounts for plaintiff unless legally restrained; but denies that it threatens to or will examine the books, or do or attempt to do any of the acts mentioned above, except in so far as the same pertains to the regulation of the rates of charges for carrying passengers and freight by plaintiff on its said steamships from points within this State to points within the same. And the defendant further denies that if it does the acts and things threatened, as in this answer above set forth, it will cause a multiplicity of suits, or will cause irreparable or any damage to plaintiff.

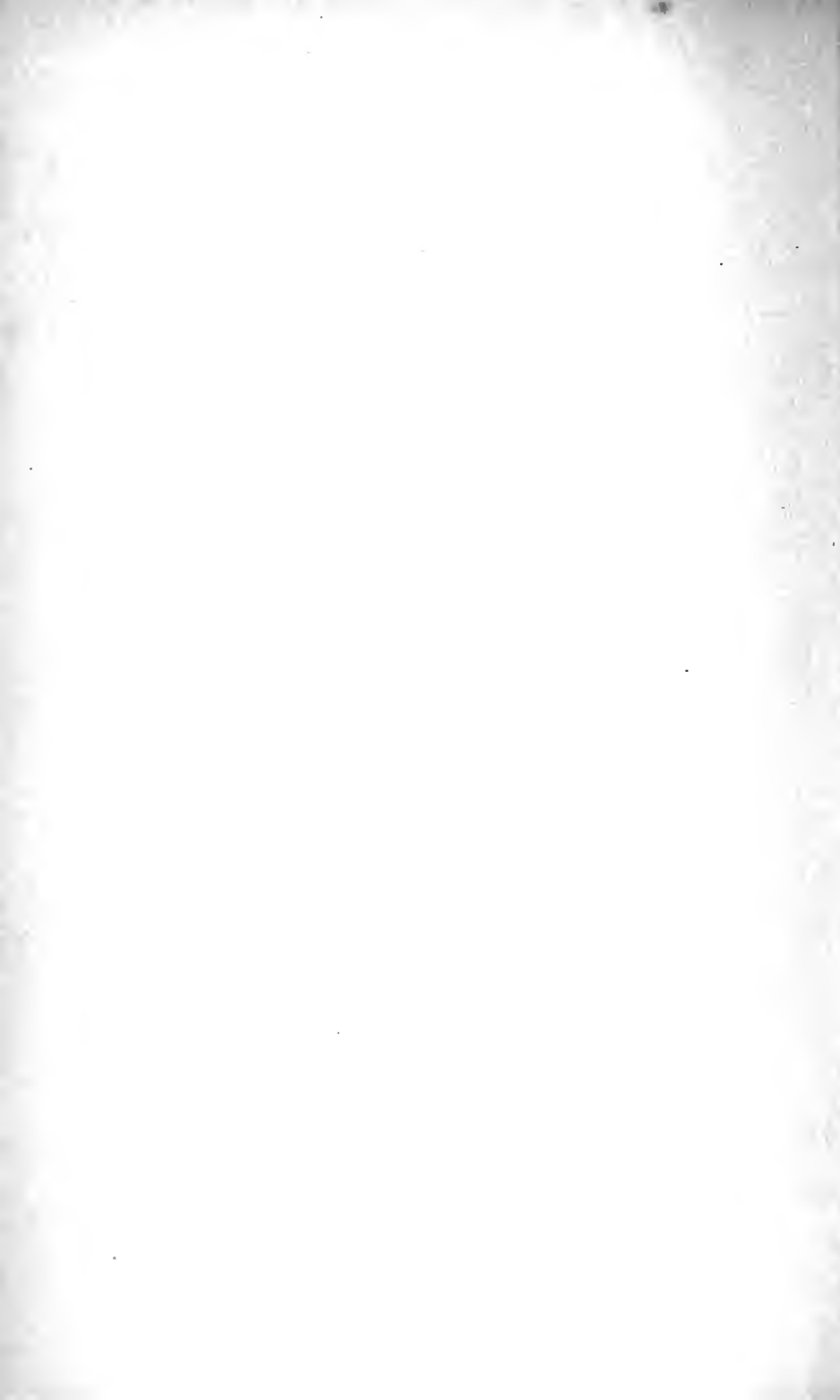
Wherefore, defendant prays judgment that plaintiff takes nothing by its action, and that defendant go hence with its costs.

D. L. SMOOT,

District Attorney of the City and County of San Francisco, Solicitor.

CLITUS BARBOUR,  
BELCHER & BELCHER, AND  
CHIPMAN & GARTER,  
Of Counsel.





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# REPORT

OF THE

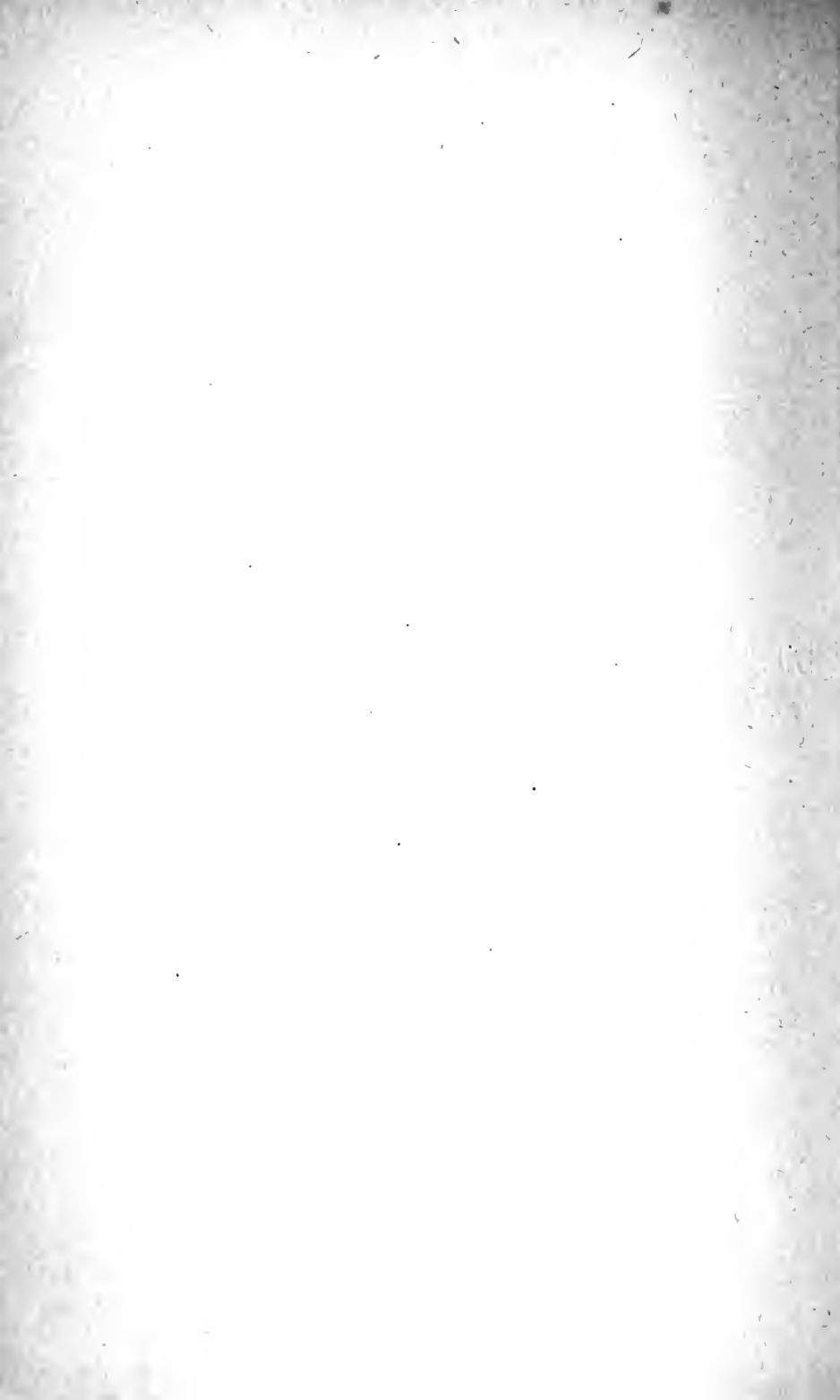
Board of Trustees of the State Normal School,

FOR THE

Year Ending June 30, 1880.

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# REPORT.

To his Excellency GEORGE C. PERKINS, Governor:

DEAR SIR: In compliance with section one thousand four hundred and eighty-nine of the Political Code, the Board of Trustees of the State Normal School beg leave respectfully to submit the following report of the institution under their charge, for the year ending June 30, 1880:

## FINANCIAL STATEMENT.

The appropriation for the support of the Normal School for the year was \$33,300.

This has been expended as follows:

For salaries of teachers, janitor, and librarian.....	\$27,383 50
For books and stationery.....	1,160 60
For furniture, apparatus, and supplies.....	2,638 06
For incidentals, viz: insurance, water, gas, etc.....	2,085 34
For printing and advertising.....	32 50
Total.....	\$33,300 00

The amounts for books and stationery, furniture, apparatus, and supplies, and incidental expenses, have, as a matter of necessity, been largely increased, by supplying the school with articles needful to replace those burned in the building. We have, however, supplied only those absolutely required, leaving the full supply until the new building is ready for occupancy.

We had intended to return to the State Treasury the sum of \$3,000, unexpended balance, and only by a careful use of this reserve fund have we been able to carry through the school, with our serious loss, without creating a deficit.

At the beginning of the year we had on hand in the Tuition Fund.....	\$199 65
Tuitions have been paid in to the Treasurer, from the Preparatory and Training School.....	3,538 75
Total.....	\$3,738 40

This we have expended as follows:

For improvement of Normal School grounds.....	\$1,976 40
Moving and fitting up building for Training School.....	280 00
Toward cleaning of ruins of old building.....	74 13
For furniture and incidental expenses.....	472 36
Balance on hand July 1, 1880.....	935 51
Total.....	\$3,738 40

It is our intention to use this balance, with the tuition money for the present year, in further improvements upon the grounds, and we hope for an appropriation from the next Legislature that will enable us to put the grounds in a condition that will better accord with the building and the school; and make them more creditable to the State than they now are.

#### THE ERECTION OF THE NEW BUILDING.

We have adopted plans and specifications for a brick building that is somewhat larger, and will be more convenient, than the building destroyed.

As we had pledged ourselves to erect the new building with the appropriation and insurance money, we have proceeded thus far with great caution. Before adopting plans we had estimates made by our architect and three experienced builders. These estimates placed the cost of the contemplated structure at from \$126,000 to \$135,000. With these assurances we have gone forward, letting contracts and beginning the work, and we feel confident that our expenditures will be somewhat within the appropriation.

An additional appropriation will doubtless be needed for furnishing, but as that was the expectation when the present appropriation was made, there will probably be no hesitation in giving us the needed amount.

#### SCHOLASTIC WORK.

For a statement of the scholastic work of the school, we respectfully refer your Excellency to the report of the Principal, which is herewith transmitted:

#### REPORT OF PRINCIPAL.

*To the Board of Trustees of the California State Normal School:*

GENTLEMEN: I have the honor to submit the report of the school under your charge, for the school year ending May 20th, 1880.

From the Registrar of the school I have the following report: Total number enrolled in the Normal School classes for the year, four hundred and sixty-eight. Of this number, something more than two hundred have been new pupils, admitted upon examination.

Fifty-nine have pursued the studies of the Senior year, and forty-five have completed the same.

One hundred and eighty-nine have pursued the studies of the Middle year, and fifty-one have completed the same. The remaining number have worked in the Preparatory or Junior classes.

We present for graduation, with Full Diplomas, a class of forty-five. Of this number, twenty-one have heretofore completed the elementary course, and taken the elementary diploma.

We also present a class of forty-four, all of whom have passed the examination for or done the work of the Junior and Middle year, and who are thus entitled to Elementary Diplomas.

The work of the school year just closed has been harmonious and efficient. The temporary disarrangement attendant upon the destruction of the building soon passed away, and the classes have, with one exception, done all the work they would have done had not the fire occurred. The Senior Class has not had the opportunity for practice work in the Training School that is desirable and necessary. Nearly two months' work in practice teaching was lost by the fact that we had no suitable rooms for the Training School.

The loss of apparatus has been seriously felt, and we hope that it will be possible to supply the school again before the opening of the coming school year.

The accommodations furnished by the City of San José have been fully appreciated by both teachers and pupils, but they are so insufficient for the real wants of the school, that we ardently hope the new building may be ready for occupancy by January, 1881.

A change of about two weeks has been made in the time of opening and closing of the second term of the year, giving a longer vacation at the time of the Christmas holidays, and bringing the closing exercises later in the Summer. This will enable more of the graduates to return to



the school to attend the Alumni Association, and will not incommode those who may desire to engage in teaching.

During the legislative discussions in reference to the Normal School, two assertions were made upon the floor, which do the school great injustice. As there was no opportunity to answer them there, I beg leave to answer them here.

One assertion was, that the Normal School is a San José or Santa Clara County High School, and that it therefore should not be sustained by the State. In answer to this charge, I submit the following:

From our records of this year, I find that 275 pupils have entered the school from outside counties. These are distributed as follows: San Francisco, 27; San Joaquin, 24; Alameda, 15; Monterey, 10; Nevada, 11; Sonoma and Sutter, each, 9; Los Angeles and Stanislaus, each, 8; El Dorado and Napa, each, 7; Santa Barbara, 6; Butte, Sacramento, San Luis Obispo, and Yuba, each, 5; Amador, Calaveras, Colusa, Mendocino, Placer, and Sierra, each, 4; Merced, San Benito, San Mateo, Siskiyou, Solano, and Tuolumne, each 3; Lassen, Marin, Mariposa, Santa Cruz, and Tulare, each, 2; Fresno, Humboldt, Kern, Plumas, San Bernardino, San Diego, Shasta, and Yolo, each, 1. From other States, pupils coming here to qualify themselves to teach in California, 16.

It would seem that this should effectually answer the charge that the school is not a *State school*.

We have always declined to receive from San José, or Santa Clara County, pupils, as free pupils, unless we were satisfied that they were fitting themselves for the work of teaching. The work aimed at has been to supply the schools of the State with trained teachers, without reference to the locality whence they came. No pupils, properly qualified, have ever been rejected from other counties to make places for pupils from Santa Clara County.

Teachers have been sent from the Normal School to every county in the State but two, and it is more than probable that some have found their way even to those counties. One thing is certain, the influence of the Normal School is felt, and felt for good, in every county in California.

Having examined the catalogues of Eastern schools, I am prepared to say that the California State Normal School has had a larger percentage of pupils from the State at large than any other school, save one (Michigan), in the United States.

The second assertion was that the graduates of the school were not as well qualified as many graduates of High Schools; that they could not pass the examination to enter the Junior Class of the University, etc.

The Normal School is not a High School; nor is it a preparatory school for the University. It has for its object the preparation of teachers for the district schools of California. Its course of study and training are all formed with this object only in view. The best graduates of the High Schools in San Francisco, Oakland, Stockton, San José, and other cities of the State, find one year's hard work to complete the reviews, studies, and training required in the Normal School. One third of the time of this year is devoted to the study and practice of teaching. A mere assertion that, after this year's work, they are not as well prepared to teach as those who know a little more Latin or French, or some other more advanced studies, can carry very little weight.

It has never been claimed that all the graduates of the Normal School will become excellent teachers; but the fact is, that the time given to the preparation for the work makes *all* much better teachers, and increases very largely the probabilities of success.

All the graduates are, so far as scholarship is concerned, qualified for their work. Our knowledge of this is based, not on a single examination, under peculiar, and many times exceptional circumstances, but upon more than a score of examinations, oral and written, continued through months and years. We may possibly err in our judgment, but there is no temptation to lead to erroneous conclusions.

The foregoing are the only serious charges made against the school, and we hope that those who heard and read the charges will also read the answers.

Thanking you, gentlemen, for your uniform kindness and consideration, and also expressing a lively appreciation of the faithful labor of every teacher in the school, I subscribe myself, very respectfully,

Your obedient servant,

CHAS. H. ALLEN, Principal.

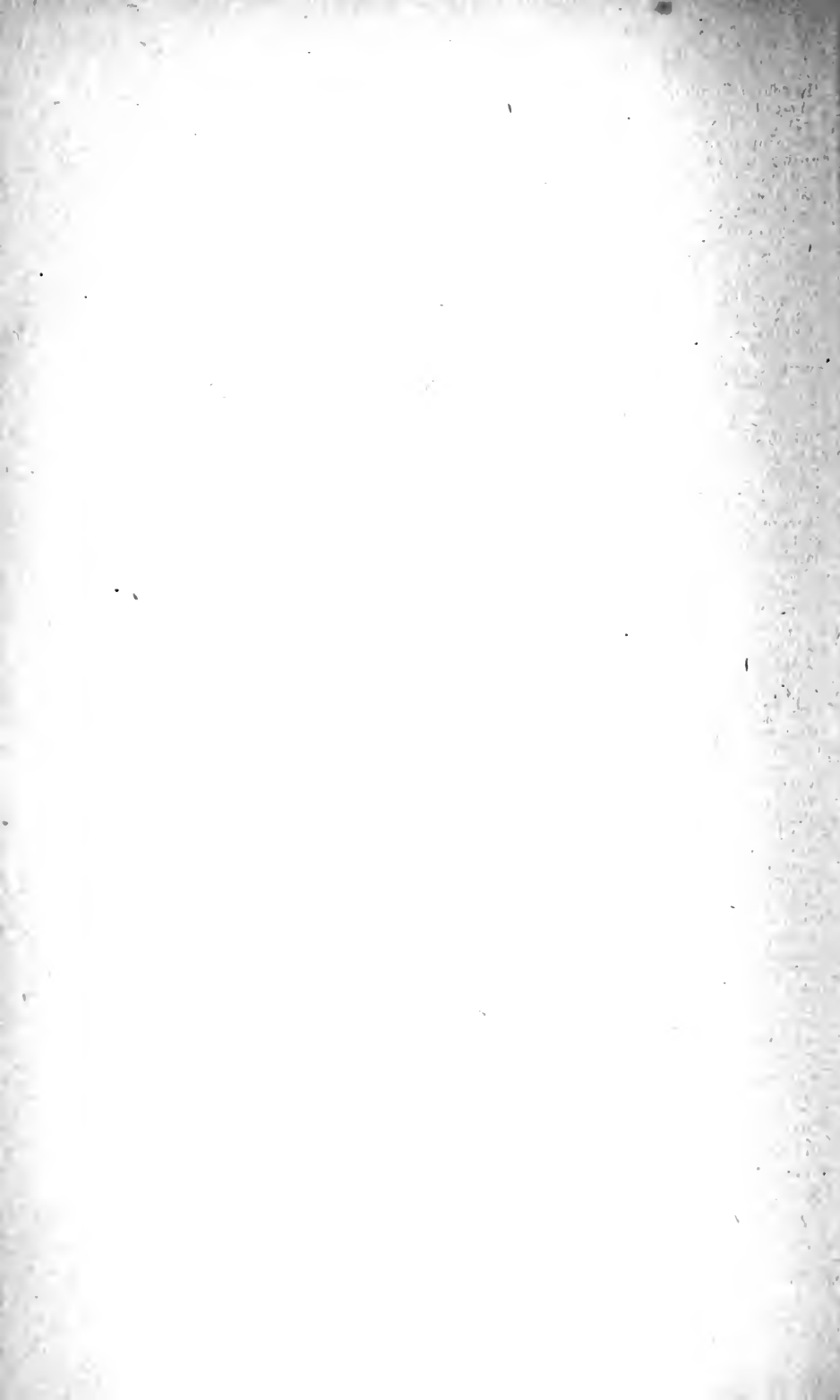
In conclusion, we would express our warm appreciation of the prompt and thoughtful courtesy of the Board of Education, and citizens of San José, in furnishing us a building for the use of the school, thus enabling the work to go on with little or no interruption.

We remain, very respectfully,

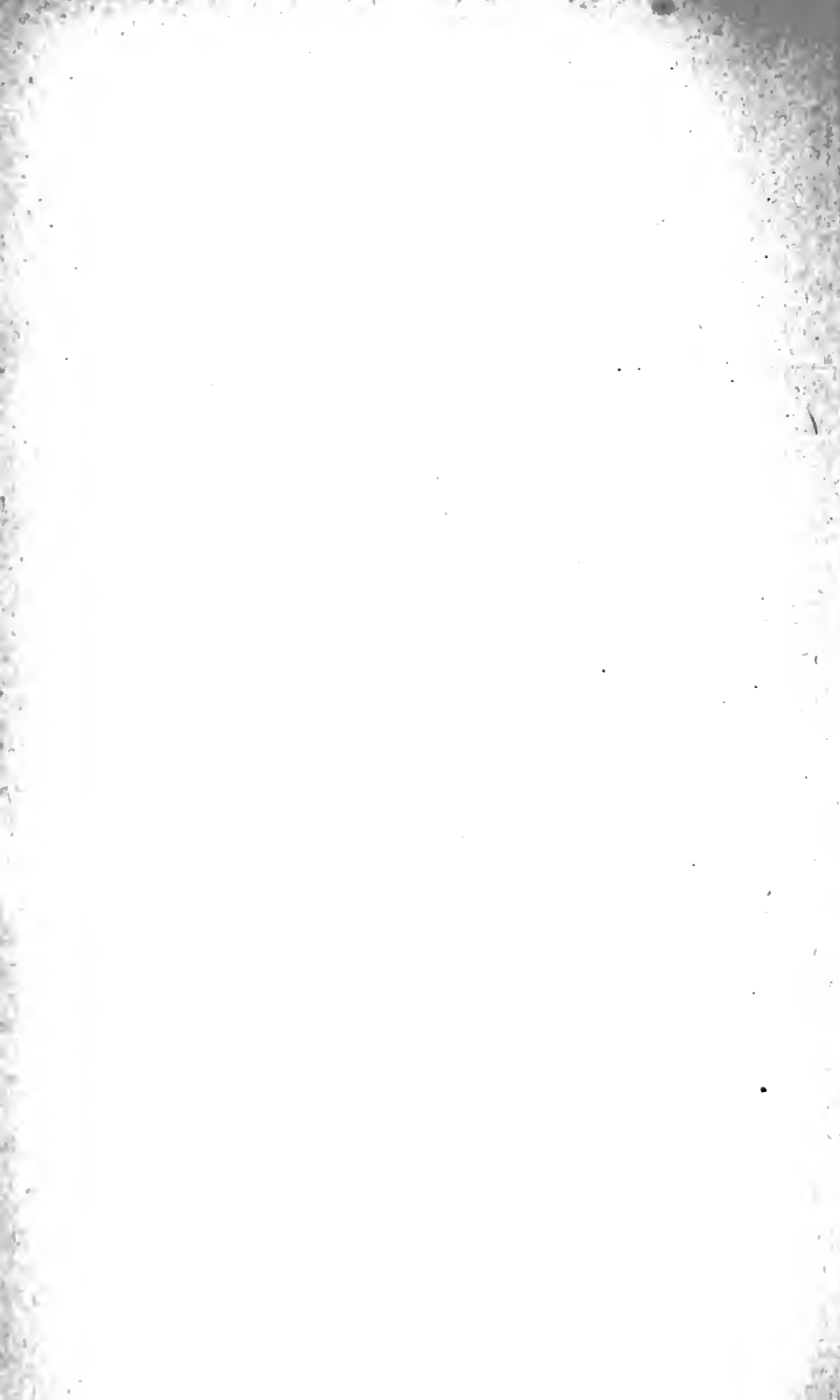
Your obedient servants,

C. T. RYLAND, Vice President.

CHAS. H. ALLEN, Secretary.







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# REPORT

OF THE

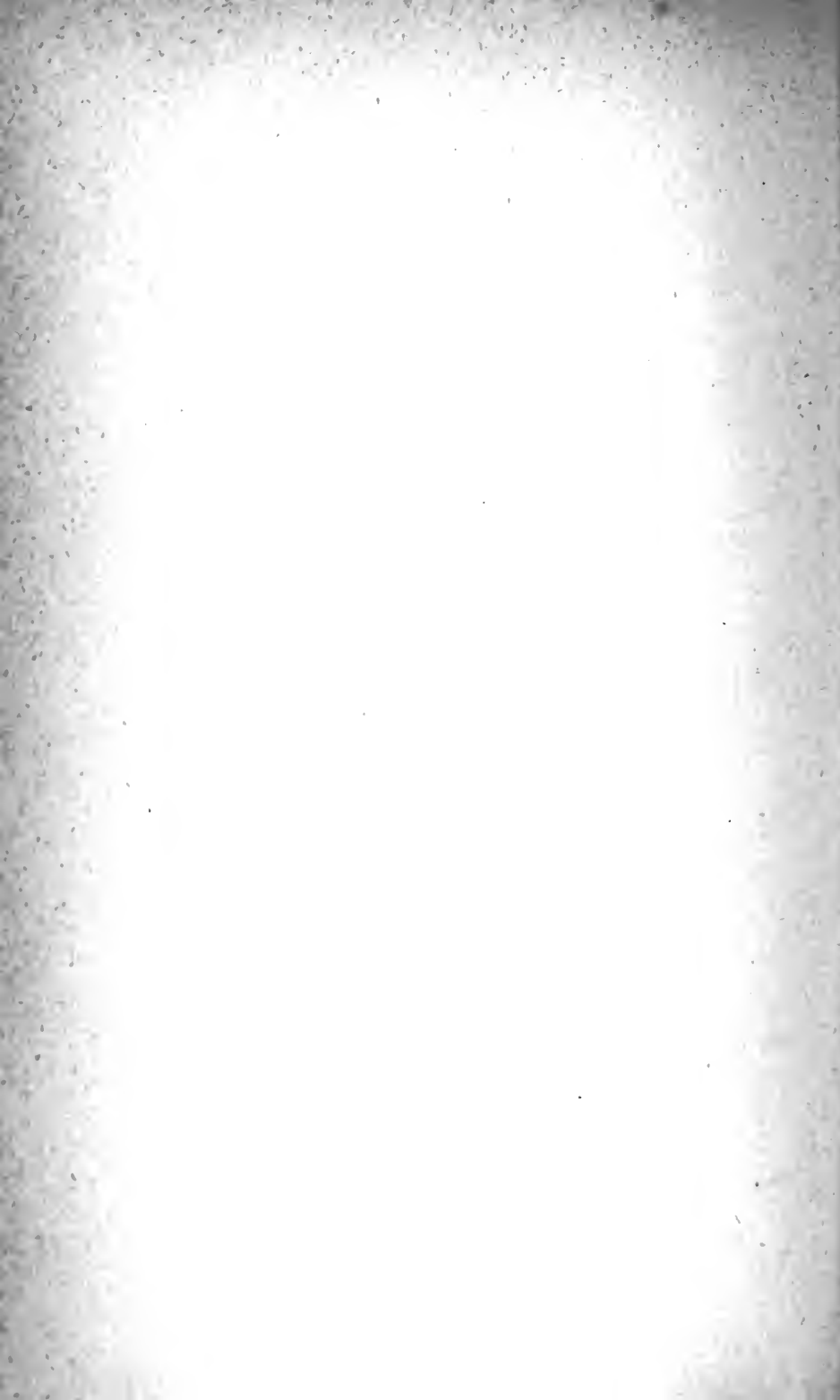
## Board of State Harbor Commissioners

FOR THE YEAR COMMENCING

July 1, 1879, and ending June 30, 1880.

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# REPORT.

*Hon. GEORGE C. PERKINS, Governor of the State of California :*

The last report submitted by the Board of State Harbor Commissioners was for the two fiscal years ending thirtieth June, eighteen hundred and seventy-nine. By Section 2537 of the Political Code, their next report should embrace the two fiscal years ending thirtieth June, eighteen hundred and eighty-one. But the last Legislature amended Section 332 of the Political Code so that the reports of the State Treasurer and other State officers should be made up to thirtieth June, eighteen hundred and eighty, and in every second year thereafter. In order to conform to this new system, the Board has deemed it advisable to make a report for the past fiscal year, and thereafter their reports will be biennial. As their reports will thus cover the same period as those of the Controller and Treasurer, a means of comparison will be furnished, and each Legislature will have before it a report from the Board for the fiscal term ending immediately before its session. This report therefore covers the period between the thirtieth June, eighteen hundred and seventy-nine, and the thirtieth June, eighteen hundred and eighty.

The following is a summary of the detailed statements hereto appended :

## RECEIPTS.

For dockage, wharfage, tolls, and rents.....	\$426,939 76
For dredging done for private parties.....	520 00
For materials sold.....	227 80
Total .....	\$427,687 56

From which it appears that the average monthly receipts have been \$35,640 63 against \$37,294 68 for the previous two years.

## DISBURSEMENTS.

The various items of the tabular statement may be grouped under the following heads :

Salaries of Commissioners, Secretary, Assistant Secretary, Engineer, Assistant Engineer and Draughtsman, Attorney, Wharfingers, Collectors, and Watchmen .....	\$89,981 85
Construction, including building of new wharves, sheds, and sewers, maintenance and repairs of outer half of water front streets, and of old wharves, building and furniture of wharf offices.....	142,527 01
Dredging. Cost of water tank boat.....	1,173 50
Wages of men, repairs of tug boats, dredgers, and scows, and cost of coal and water.....	51,675 28
Fire account.....	2,140 53
Wharf cleaning.....	2,864 00
Sea wall construction.....	309,652 90
General expenses, including office rent, fuel, stationery, printing, legal expenses, damage to vessels, removal of obstructions in harbor, and other small items....	6,686 85
Total .....	\$606,701 92

Deduct from such total disbursements the following items, which represent fixed capital, viz:

Construction of new wharves, etc.....	\$142,527 01
Cost of water tank boat.....	1,173 50
Construction of sea wall.....	309,652 90
Total.....	\$453,353 41

The balance of \$153,348 51 will represent the current expenses for the year, and show an average monthly expense of about \$12,779 04 against \$13,817 76 for the previous two years.

#### HARBOR IMPROVEMENT FUND.

Amount to its credit 30th June, 1879.....	\$487,725 11
Remitted to State Treasurer from that date to 30th June, 1880.....	240,414 91
Total.....	\$728,140 02
Drawn from the fund 30th June, 1879, to 30th June, 1880.....	\$419,429 27
Amount to credit of fund 30th of June, 1880.....	\$308,710 75
The amount remitted to the State Treasurer has averaged per month.....	\$20,034 57

It will be found that the State Treasurer's statement of the amount to the credit of the fund does not agree with the above figures, because \$7,635 72 of the receipts of June, eighteen hundred and eighty, did not reach him till second July, after the closing of his annual accounts on thirtieth June. It is only after all monthly settlements are made at the office of the Board that the June balance can be remitted to the State Treasurer.

#### NEW WORK.

It may be classed under four heads:

I. That which was contracted for prior to thirtieth June, eighteen hundred and seventy-nine, and has been completed during this fiscal year.

*Vallejo Street Wharf.*—Contract made twelfth May, eighteen hundred and seventy-nine. It extends to the pier-head line, seven hundred and fifty-three feet long by eighty feet wide. Contract price, \$32,658 68. To June thirtieth, eighteen hundred and seventy-nine, \$7,000 had been paid. Since then it has been finished, and the balance of \$25,658 68 has been paid during this fiscal year.

<i>Section No. 1 of the Seawall.</i> —On this work there had been paid, up to June thirtieth, eighteen hundred and seventy-nine.....	\$60,894 15
From that date to June 30th, 1880, there was paid the balance due on the contract.....	35,105 85
Total.....	\$96,000 00

That amount being the whole contract price.



<i>Section No. 2, Seawall.</i> —On this work there had been paid, up to June thirtieth, eighteen hundred and seventy-nine-----	\$29,942 32
From that date up to June thirtieth, eighteen hundred and eighty, there was paid the balance due on the contract-----	87,188 02
Total-----	\$117,130 34

That amount being the cost of completion of the section as per contract.

II. That which was contracted for prior to thirtieth June, eighteen hundred and seventy-nine, and has not yet been completed.

*Section No. 3, Seawall.*—On this work there was paid from June thirtieth, eighteen hundred and seventy-nine, to June thirtieth, eighteen hundred and eighty, \$51,085 51. Work is still in progress.

III. That which was contracted for during this fiscal year and completed during the year.

*Widening Section No. 1, Seawall.*—An additional one hundred and nine feet, making the section two hundred feet wide. Cost, \$69,631 42.

*Widening Section No. 2, Seawall.*—An additional one hundred and nine feet, making the section two hundred feet wide. Cost, \$50,373 75.

*Suspended Sewer under Washington Street Wharf.*—Extending from the foot of Washington and Jackson streets along and across East street to the pier-head line at the end of Washington Street Wharf; being seven hundred and thirty-one and a half feet of main sewer and five hundred and thirteen feet of connecting sewers. Cost, \$6,776 37.

*Wharf and Bulkhead along East Street from the South Pacific Coast Railroad Ferry Slip to the South Line of Howard Street.*—Length about nine hundred and seventy-five feet; width about one hundred feet. Cost, \$28,185 92.

*Wharf Between Mission and Howard Streets.*—Eighty feet wide by five hundred and seventy-two feet long, extending from East street to pier-head line. Cost, \$24,801 86.

*Wharf and Bulkhead extending Southerly along East Street from the South Line of Howard Street.*—One hundred feet in width and two hundred and six feet in length. Cost, \$6,043 30.

*Roadway connecting Montgomery Street with Section No. 2 of the Seawall.*—Fifty-four feet in width, seventy-seven feet in length. Cost, \$1,514.

*Widening Spear Street Wharf.*—From the south line of Bryant street to a point five hundred feet north; ten feet in width, and replanking the adjacent street. Cost, \$6,629 95.

*Reconstruction of Harrison Street Wharf.*—Cost, \$1,814 19.

IV. That which was contracted for during this fiscal year and has not yet been completed.

*Section A Seawall, extending from Section 1 of the seawall westwardly, five hundred and sixty-one feet to the West Line of Powell Street, produced.*—Contract made December eighteenth, eighteen hundred

and seventy-nine. This section is full two hundred feet in width. On this work there has been paid up to June thirtieth, eighteen hundred and eighty, \$11,591 30. Work is still in progress.

*Section No. 4 of the Seawall, extending one thousand feet east from Section 3.*—Contract was made for this work on March twenty-seventh, eighteen hundred and eighty, but no payments have been made thereon up to June thirtieth, eighteen hundred and eighty. Work still in progress.

*Flooring for Shed on Section No. 2 of the Seawall, between Montgomery and Kearny Streets, and Extension of Montgomery Street to the Seawall.*—Contract made May twenty-fifth, eighteen hundred and eighty, for \$11,344. No payments were made up to June thirtieth, eighteen hundred and eighty.

*Shed on Section No. 2 of the Seawall, between Montgomery and Kearny Streets.*—One hundred feet in width, one thousand feet in length. Contract made June fifth, eighteen hundred and eighty, for \$13,874. No payments made thereon up to June thirtieth, eighteen hundred and eighty.

*Shed on Spear Street Wharf.*—Two hundred and seventy-one feet long by eighty feet wide. Contract made April seventeenth, eighteen hundred and eighty. Cost, \$2,750. Further extension of the same shed thirty-five feet, cost, \$350. This work was not finished until after thirtieth of June, eighteen hundred and eighty, and will appear in the next report.

*Widening New Broadway Wharf.*—Thirty feet on the north side, five hundred and thirty feet in length. Contract made June twenty-second, eighteen hundred and eighty. Cost, \$7,440, which will appear in the next report.

*Ferry Slip and approach South of the Market Street Ferry Slips.*—Contract made June twenty-second, eighteen hundred and eighty. Contract price, \$35,355. No payments made thereon up to June thirtieth, eighteen hundred and eighty.

#### SEAWALL.

*Section 1* was completed July twenty-fourth, eighteen hundred and seventy-nine, and three months thereafter, which time was allowed for settling, the work was accepted and paid for.

*Section 2* was completed January sixth, eighteen hundred and eighty, and three months thereafter, which time was allowed for settling, the work was accepted and paid for.

*Widening Section 1.*—The contract was made on August twenty-seventh, eighteen hundred and seventy-nine, for this work, consisting of an earth embankment to the level of the city base, of a surface width of one hundred and nine feet, and a surface length of one thousand feet, protected on its inner side by a lining of stone, and covered to a depth of two feet with gravel and small stone. The price for the work was 29.9 cents per cubic yard of filling.

*Widening Section 2.*—The contract was made on August twenty-seventh, eighteen hundred and seventy-nine, for this work, consisting of an earth embankment to the level of the city base, of a surface width of one hundred and nine feet, and a surface length of one thousand feet, protected on its inner side by a lining of stone, and covered to a depth of two feet with gravel and small stone. The price was thirty cents per cubic yard of filling.

*Section A.*—The contract for this work was made on December eighteenth, eighteen hundred and seventy-nine. It consists of a wharf, a stone embankment of similar construction to those of Sections 1 and 2, of which it was a westerly continuation to the west line of Powell street, and an earth embankment on its inner side; the whole work being five hundred and sixty-one feet in length and two hundred feet in width. The contract price of this work, was for the wharf in front, \$14,800; for the stone embankment, fifty-three cents per cubic yard; for the earth embankment, twenty-four cents per cubic yard. It will be completed about December first, eighteen hundred and eighty.

*Section 3.*—In the last report it was stated that a suit had been instituted in the State Courts by the owner of a lot fronting on the water front line, established by Act of the Legislature, approved twenty-sixth March, eighteen hundred and fifty-one, to enjoin the construction of Section 3 of the sea wall on the new line established September twelfth, eighteen hundred and seventy-seven. In that suit the right of the State to change the line of eighteen hundred and fifty-one was denied, at least without compensation for the damage alleged to be the result of such change. In December, eighteen hundred and seventy-nine, the case was decided by the Supreme Court, it being held by that tribunal that the Act of twenty-sixth March, eighteen hundred and fifty-one, did not create a contract between the State on the one side, and the grantees of the beach and water lots mentioned in the Act, on the other side, to the effect that the water front line as defined in the first section of that Act should be and remain the permanent water-front of the City of San Francisco. Thereupon the contractor immediately resumed work on the section, and it is being rapidly pushed to completion. It will be finished about the first of January, eighteen hundred and eighty-one.

In consequence of this litigation and other suits against the contractor to enjoin his taking material from Telegraph Hill, the work on Section 4 has also been retarded, and the Board has granted an extension of time for its completion to October first, eighteen hundred and eighty-one.

*Section 4.*—The contract for this work was made on March twenty-seventh, eighteen hundred and eighty. It consists of a stone embankment, earth embankment, and a wharf, extending one thousand feet eastwardly from Section 3, to a point near the south line of Filbert street, being two hundred feet in width, and of similar construction with the other sections. The contract price for this work was, for the wharf, \$24,500; for the stone embankment, sixty-nine and a half cents per cubic yard; for earth embankment, thirty-four cents per cubic yard.

As directed by Section 2536, Political Code, the Governor and Mayor of the City of San Francisco have conferred with the Board in relation to all this work, and the contracts have been made with their approval. The contracts have been let to the lowest bidder in the manner directed by the statute.

Since the completion of Sections 1 and 2, it has been found that the upper face of the stone embankment has been assuming a flatter slope than two to one, which was the original plan of construction. The slope, therefore, of Section 3 has been changed to three to one, and that of Section A to four to one. Section 4 will be constructed with a slope of four to one.

Under the head of "New Work," it will be observed that two large sheds, each about one thousand feet in length by one hundred feet in width, are to be constructed on Sections 1 and 2 of the seawall. In pursuance of the authority vested in them by Act of the Legislature of seventeenth March, eighteen hundred and eighty, the Board intend to devote those two sections, and the sheds thereon, to the accommodation of the grain business, without, however, allowing the sheds to be used as warehouses.

#### URGENT REPAIRS.

The law, as it now stands, allows the expenditure of but \$3,000 per month for urgent repairs. This amount has been found to be inadequate for keeping the wharves and streets along the water front in proper condition. Piles and planking need constant renewal, and as the number of wharves is constantly increasing, the cost of repair is greater. The Board is also of the opinion that the whole width of the roadway along the water front should be kept in repair by the State. At present the cost is divided between the State, the city, and the property owners. The reasons for this opinion are:

1. That the wear is caused almost exclusively by the traffic on and off the wharves upon which the State collects revenue.
2. The constant replanking and repairs required on such streets is an onerous burden on the property fronting thereon, without an adequate benefit in return.
3. It often occurs that the inner half of such streets is left for months at a time by the city and property owners in an impassable condition, thereby forcing the main travel on the outer half, which the law requires the Board to keep in repair, and reducing the area and facilities for travel to but half the width of the street.

#### SEWERS.

Section 2525, Political Code, as amended in eighteen hundred and seventy-six, authorized the Commissioners to construct across the outer half of the streets bounding on the water-front an extension of the sewers of the city.

An Act, approved fifteenth March, eighteen hundred and seventy-eight (Stats. 1877-8, p. 263), provided that the seawall and adjacent thoroughfare should be of the width of two hundred feet, and that they should be under the control and jurisdiction of the Commissioners for the purposes of construction, repair, etc. But the Act is silent as to the construction of sewers across the two hundred feet. It would seem doubtful, therefore, whether the Commissioners are vested with power to construct such transverse sewers. As they must necessarily be of a permanent character, either brick or stone, involving considerable cost, it would be advisable for the Legislature at its next session to authorize their construction, provided that the present system of discharging the city sewers into the docks is to be continued. It is the judgment of this Board, however, that such system should not be continued, for the reasons that it adds greatly to the costs of dredging, and causes the deposit of matter in the docks injurious to the health and comfort of all who live near or do business on the water-front.

The advance of the seawall southwardly along the city front makes.

it necessary that this question should be decided at an early day. Such transverse sewers should be constructed at the same time as the seawall, and must conform in location, grade, and size with the city sewers, with which they connect as outlets. If, at some future day, the system of discharge into the docks should be changed, the money expended in their construction will be thrown away, for they will serve no purpose. The decision of this question rests with the city authorities, and their early attention to the subject is respectfully invited. The necessity of some action on their part is already being felt at those sections of the seawall which have been completed and those being constructed, and will be more seriously felt each year as the seawall reaches the outlets of the main sewers of the city.

This Board can do no more in the matter than to conform to the system adopted by the city. The subject demands early and earnest attention.

#### DREDGING.

It will be seen by the annexed tabular statement that there has been during the past fiscal year a further reduction in the cost of dredging. Including every item of expense of wages of men, coal, repairs of tugs and dredgers, and ship chandlery, the cost per cubic yard of mud removed from the docks has been 6.89 cents against 7.16 cents the previous year, and 9.02 cents the year before that.

Channel street, as far as ebb and flow of tide, having been placed by Act of Legislature under the jurisdiction of the Board, they have caused it to be dredged from China Basin to Seventh street, a distance of three thousand six hundred and ninety-seven feet, to a depth sufficient for vessels drawing twelve feet of water.

#### ENGINEER WORK.

This department has been kept very busy during the past year. Every piece of work being done has been carefully supervised by a special inspector, where the Engineer or his Assistant were unable by press of other duties to give their personal supervision.

This will account for the frequent recurrence of the item "super-vising construction," in the Construction Statement.

#### WHARF CLEANING.

The same system during the past year has been continued as stated in the previous report. The cost is \$220 per month. With this moderate expense all the wharves (except Broadway and Washington street) and the outer half of the streets bounding on the waterfront, are kept in good order. Those excepted wharves require special treatment.

#### PROTECTION AGAINST FIRE.

It will be observed that in the "Statement of Disbursements" the item occurs of "Fire account, \$2,140 53." This arose from the necessity of giving more efficiency to the tugs "Gov. Irwin" and "Anasha," which, as was stated in the last report, had been provided with fire pumps and apparatus. For that purpose the Board organized for night service on the "Gov. Irwin" a force consisting of a captain, an

engineer, a fireman, and a deck hand. It is their special duty to have the boat ready at a moment's warning. A hose company paid by the city is in attendance during the night on this boat ready to aid in shore duty. By this arrangement it is impossible for a fire to occur on the water-front, where the State has so much valuable property, without the immediate presence of a very powerful fire force. The "Irwin" has been brought into service during the year on several occasions with promptness and efficiency.

## FINANCES.

On the thirtieth of June, eighteen hundred and seventy-nine, the amount to the credit of the Harbor Improvement Fund was \$487,725 11. On the thirtieth of June, eighteen hundred and eighty, the amount was \$308,710 75, showing a decrease of \$179,014 36. But it must be considered, in this connection, that, besides paying all the current expense of collection of the revenue, urgent repairs, and cost of dredging, there has been constructed:

New wharves, costing .....	\$114,968 90
Seawall .....	309,652 90
Total .....	\$424,621 80

On the thirtieth of December, eighteen hundred and seventy-nine, the tolls were reduced as follows: All the twelve and a half cent rates were reduced to ten cents, and all the six and a quarter cent rates were reduced to five cents—this was applicable to all merchandise—and, in addition, the rate on lumber was reduced from ten cents to five cents per thousand feet; on coal, from ten cents to five cents per ton; and on wood, from twelve and a half cents to five cents per cord; so that, for the latter half of the fiscal year, the rates on general merchandise were reduced twenty-five per cent., on lumber and coal fifty per cent., and on wood sixty-six per cent.

On the fourth of June, eighteen hundred and eighty, the rules as to dockage on vessels were changed, so that instead of the day of arrival and day of departure being charged for as full days, the day was reckoned from the hour of arrival to the same hour on the succeeding days.

It is certain that these changes of wharfage and tolls diminished the revenue for the latter half of the fiscal year, but to what extent the Board is unable to say.

It has been the opinion of the Board for some years past that the cost of collection of the revenue is too great. Taking the past fiscal year as an illustration (and the same thing is true to a greater or less degree of all former years), it appears that the revenue actually collected by the wharfingers and collectors—rents, etc., being paid in directly to the office—amounts to \$372,613 58; salaries of wharfingers and collectors, \$62,581 85. That is, the cost of collection was 16.8 per cent. of the amount collected.

This, with other reasons which need not be stated, has led the Board to the conviction that a better system of collection than that by toll collectors could be devised; and, at their instance, the Legislature, at its last session, passed an Act (Statutes of 1880, page 10) which was intended to substitute a different system. That system was, in effect, the collection of the wharfage of merchandise directly

from the master, owner, or consignee of the vessel, upon the weight or measurement stated in the ship's manifest, instead of by the load as it was hauled on or off the wharf. As, however, it was deemed almost impossible to apply the system to vessels navigating the inland waters of the State, and coasters, the Act provided that all merchandise passing to and fro between San Francisco and any port or place in the State of California, should be exempt from wharfage. About the time of the passage of this Act, the Supreme Court of the United States decided, in the case of *Gay vs. the City of Baltimore*, that no State can, consistently with the Federal Constitution, impose upon the product of other States brought therein for sale or use, or upon citizens because engaged in the sale therein or the transportation thereto of the products of other States, more onerous public burdens or taxes than it imposes upon the like products of its own territory. It was clear, from this decision, that no such discrimination as that provided by the Act could be made; and, after conference with their attorney, the Board determined, in view of the legal difficulties which would result from an attempt to put in force the proposed system, to adhere to the present system until further legislation could be had. They will take occasion at the next session of the Legislature to submit a bill on the subject.

#### LITIGATION.

The annexed report of the attorney of the Board will show the character of the litigation in which the Board has become involved in discharging the duties imposed on them by law. Special reference needs to be made to but one of the cases, viz: that of the Board vs. The San Francisco Gas-light Company. The company declined to pay the wharfage on their coal landed at the wharf erected by them, claiming that they were exempt from such wharfage by the terms of their lease from the State. The Supreme Court, however, held otherwise, and they paid the amount of \$14,699 10 to the Board, being the arrears for some years past.

WM. BLANDING,  
GEORGE S. EVANS,  
WM. A. PHILLIPS,

*Board of State Harbor Commissioners.*

BOARD OF STATE HARBOR COMMISSIONERS' ANNUAL REPORT—SHOWING THE  
RECEIPTS AND DISBURSEMENTS FOR THE FISCAL YEAR ENDING JUNE  
30TH, 1880.

<i>Receipts.</i>	
Section 1, Sea-wall Wharf	\$1,811 55
North Point and Eureka Wharves	7,225 57
Battery Street Wharf	8,104 30
Front and Union Street Wharf	20,779 92
Green Street Wharf	19,077 75
Vallejo Street Wharf	24,281 85
Broadway Street Wharf	26,760 71
Pacific Street Wharf	29,306 45
Jackson Street Wharf	20,990 25
Washington Street Wharf	30,136 30
Oakland Ferry Wharf	78,808 85
Mission Street Wharf	16,478 78
Howard Street Wharf	10,924 66
East Street Wharf	9,223 73
Folsom Street Wharf	15,671 20
Harrison and Spear Streets Wharf	17,548 71
Main Street Wharf	13,765 95
Second and Berry Streets Wharf	16,380 35
Channel Street Wharf	2,506 15
Channel Street South Wharf	480 55
Wharf south of Ferries	1,650 00
Space for scales	606 00
Union Lumber Association (as per lease)	4,800 00
Pacific Mail Steamship Company (lease)	15,000 00
Central Pacific Railroad Company (tolls)	30,335 18
Merchants' Dry Dock Company (rent)	3,300 00
U. S. Barge Office (rent)	240 00
Expense account—for rent of back office	45 00
Dredger No. 1—sale of old iron	80 00
Dredger No. 2—sale of old iron	47 80
Dredger No. 2—for dredging dry docks	520 00
Urgent repairs—sale of old lumber	100 00
Steuart Street Wharf	700 00
Received from all sources	\$427,687 56
San Francisco Harbor Improvement Fund—amount drawn	419,429 27

<i>Disbursements.</i>	
Salaries of Commissioners and Secretaries	\$14,100 00
Salaries of Wharfingers, Collectors, and Watchmen	62,581 85
Salary of Attorney	2,400 00
Salaries of Chief Engineer, Assistant, and Draughtsman	6,000 00
Salaries of Chief Wharfinger and Assistant	4,800 00
Expense account—rent, fuel, stationery, etc.	5,771 80
Urgent repairs—amount paid	26,053 24
Construction account—amount paid	114,968 90
Steam dredger—purchase account	1,173 50
Dredger No. 1—current expenses	14,063 72
Dredger No. 2—current expenses	14,317 42
Tug Anashia—current expenses	9,245 87
Tug Gov. Irwin—current expenses	14,048 27
Fire account—current expenses	2,140 53
Cleaning wharves	2,864 00
Legal expense	202 10
Seawall account	309,652 90
Profit and loss—damages to bark "Agalea" and schooner "Broadgauge"	370 00
Office appropriation—furniture, etc.	296 16
Wharf offices and furniture	1,208 71
Harbormaster's expense account—notice to remove vessels in the stream	125 00
Overpaid dockage returned	80 25
Gas used at Washington Street Wharf	59 70
Moving vessels	18 00
Office rent—Second and Berry Streets Wharf	60 00
San Francisco Harbor Improvement Fund—amount remitted	240,414 91
Total	\$847,116 83



STATEMENT OF THE AMOUNT PAID ON ACCOUNT OF CONSTRUCTION, FOR THE  
FISCAL YEAR ENDING JUNE 30TH, 1880.

Date.	To Whom Paid.	On Account of—	Amount.
1879.			
July 14.	O. F. Graves	Vallejo St. Wharf—on account	\$15,000 00
July 15.	Adams & Taylor	Extras on Dry Docks, Wharves and Slips.	269 25
July 23.	O. F. Graves	Vallejo St. Wharf	10,658 68
July 23.	Adams & Taylor	Lumber furnished as per award	1,354 48
July 26.	J. W. Donohue	Supervising construction	66 00
July 29.	E. C. Boobar	Driving and pulling piles	787 00
Aug. 23.	W. J. Adams	Lumber furnished as per award	1,036 36
Aug. 27.	Daily Examiner	Advertising for construction	16 00
Aug. 30.	J. W. Donohue	Supervising construction	54 00
Sept. 4.	Daily Alta	Advertising for construction	11 60
Sept. 15.	Winterburn & Co.	Printing specifications	16 00
Sept. 23.	W. J. Adams	Lumber furnished as per award	1,860 89
Sept. 29.	Winterburn & Co.	Printing specifications	12 00
Sept. 30.	J. W. Donohue	Supervising construction	57 00
Oct. 3.	Daily Alta	Advertising for construction	11 60
Oct. 21.	Daily Examiner	Advertising for construction	19 20
Oct. 21.	Daily Examiner	Advertising for construction	11 60
Oct. 31.	J. W. Donohue	Supervising construction	81 00
Nov. 4.	John N. Risdon	East St., bet. Ferry and Howard St.—on account.	5,000 00
Nov. 4.	Winterburn & Co.	Printing specifications	11 00
Nov. 12.	W. J. Adams	Mission Wharf, No. 2—on account	5,000 00
Nov. 29.	J. W. Donohue	Supervising construction	72 00
Dec. 3.	Daily Alta	Advertising for construction	13 85
Dec. 16.	W. J. Adams	Mission Wharf, No. 2—on account	8,000 00
Dec. 16.	John N. Risdon	East St., bet. Ferry and Howard St.—on account.	15,000 00
Dec. 31.	J. W. Donohue	Supervising construction	78 00
1880.			
Jan. 6.	W. J. Adams	Mission Wharf, No. 2	11,801 86
Jan. 6.	John N. Risdon	East St., bet. Ferry and Howard St.	8,185 92
Jan. 10.	Winterburn & Co.	Printing specifications	11 00
Jan. 14.	W. J. Adams	Sewer under Washington St. Wharf, on account.	1,500 00
Jan. 16.	Daily Examiner	Advertising for construction	14 50
Jan. 16.	Daily Alta	Advertising for construction	13 05
Jan. 28.	Winterburn & Co.	Printing specifications	15 00
Jan. 31.	J. W. Donohue	Supervising construction	81 00
Feb. 20.	W. L. Richardson	Connection bet. Montgomery St. and seawall	1,514 00
Feb. 24.	W. J. Adams	Sewer under Washington St. Wharf	5,276 37
Feb. 28.	J. W. Donohue	Supervising construction	69 00
Mar 3.	O. F. Graves	East St., south of Howard St.	6,043 30
Mar. 10.	Daily Examiner	Advertising for construction	13 05
Mar. 31.	J. W. Donohue	Supervising construction	72 00
April 15.	W. L. Richardson	Reconstruction of Harrison St. Wharf	1,083 80
April 16.	Talcott & Onderdonk	Extras on new ferry slips	5,722 50
April 24.	Winterburn & Co.	Printing specifications	18 00
April 29.	W. L. Richardson	Driving piles at Harrison St. Wharf	731 15
April 30.	J. W. Donohue	Supervising construction	66 00
May 10.	Daily Alta	Advertising for construction	23 20
May 25.	W. J. Adams	Lumber furnished as per award	1,289 79
May 29.	J. W. Donohue	Supervising construction	79 50
June 1.	Thos. Thomson & Co.	Widening Spear St. Wharf	6,629 95
June 5.	Winterburn & Co.	Printing specifications	9 00
June 9.	Daily Alta	Advertising for construction	23 20
June 28.	Winterburn & Co.	Printing specifications	17 00
June 28.	Savage & Son	Pipe conductor for shed on seawall	75 00
June 30.	Daniel Toland	Services placing water pipes	12 25
June 30.	J. W. Donohue	Supervising construction	81 00
			\$114,968 09

STATEMENT OF THE SAN FRANCISCO HARBOR IMPROVEMENT FUND FOR THE  
FISCAL YEAR ENDING JUNE 30TH, 1880.

Dr.

1879.				
July	18	To amount remitted by Commissioners.....	\$6,000 00	
July	30	To amount remitted by Commissioners.....	5,000 00	
Aug.	2	To amount remitted by Commissioners.....	10,531 46	
Total amount remitted by Commissioners for July.....				\$21,531 46
Aug.	18	To amount remitted by Commissioners.....	\$7,000 00	
Sept.	2	To amount remitted by Commissioners.....	12,894 03	
Total amount remitted by Commissioners for August.....				19,894 03
Sept.	16	To amount remitted by Commissioners.....	\$8,000 00	
Sept.	29	To amount remitted by Commissioners.....	8,000 00	
Oct.	2	To amount remitted by Commissioners.....	9,582 13	
Total amount remitted by Commissioners for September.....				25,582 13
Oct.	14	To amount remitted by Commissioners.....	\$7,000 00	
Nov.	1	To amount remitted by Commissioners.....	16,000 00	
Nov.	3	To amount remitted by Commissioners.....	4,151 22	
Total amount remitted by Commissioners for October.....				27,151 22
Nov.	20	To amount remitted by Commissioners.....	\$9,000 00	
Dec.	2	To amount remitted by Commissioners.....	11,542 85	
Total amount remitted by Commissioners for November.....				20,542 85
Dec.	16	To amount remitted by Commissioners.....	\$9,000 00	
1880.				
Jan.	3	To amount remitted by Commissioners.....	12,735 75	
Total amount remitted by Commissioners for December.....				21,735 75
Feb.	3	To amount remitted by Commissioners.....	\$13,171 54	
Total amount remitted by Commissioners for January.....				13,171 54
March	3	To amount remitted by Commissioners.....	\$12,065 13	
Total amount remitted by Commissioners for February.....				12,065 13
March	19	To amount remitted by Commissioners.....	\$6,000 00	
April	3	To amount remitted by Commissioners.....	11,200 24	
Total amount remitted by Commissioners for March.....				17,200 24
April	19	To amount remitted by Commissioners.....	\$7,000 00	
May	4	To amount remitted by Commissioners.....	9,279 31	
Total amount remitted by Commissioners for April.....				16,279 31
May	22	To amount remitted by Commissioners.....	\$7,000 00	
May	26	To amount remitted by Commissioners.....	14,000 00	
June	2	To amount remitted by Commissioners.....	10,625 53	
Total amount remitted by Commissioners for May.....				31,625 53
June	24	To amount remitted by Commissioners.....	\$6,000 00	
July	2	To amount remitted by Commissioners.....	7,635 72	
Total amount remitted by Commissioners for June.....				13,635 72
Total amount remitted.....				\$240,414 91
Balance in San Francisco Harbor Improvement Fund, July 1st, 1879.....				487,725 11
				\$728,140 02

STATEMENT OF THE SAN FRANCISCO HARBOR IMPROVEMENT FUND, FOR THE  
FISCAL YEAR ENDING JUNE 30TH, 1880.

Cr.

Date.	Order.	No.	Contract.	Amount.
1879.				
July 7..	Andrew Onderdonk..	177	Construction of Seawall.....	\$6,440 85
July 7..	Andrew Onderdonk..	178	Construction of Seawall.....	18,756 44
July 14..	O. F. Graves.....	179	Vallejo St. Wharf—on account.....	15,000 00
July 23..	O. F. Graves.....	180	Vallejo St. Wharf—on account.....	10,658 68
July 23..	Adams & Taylor.....	181	Lumber furnished.....	1,354 48
July 24..	Andrew Onderdonk..	182	Construction of Seawall.....	4,665 00
July 29..	E. C. Boobar.....	183	Driving and pulling piles.....	787 00
Aug. 4..	Andrew Onderdonk..	184	Construction of Seawall.....	7,310 58
Aug. 19..	Middlemas & Boole..	185	Boat and water tank for Dredger No. 1..	1,050 00
Aug. 22..	W. J. Adams.....	186	Lumber furnished.....	1,036 36
Sept. 4..	Andrew Onderdonk..	187	Construction of Seawall.....	10,811 00
Sept. 23..	W. J. Adams.....	188	Lumber furnished.....	1,860 89
Oct. 1..	Andrew Onderdonk..	189	Construction of Seawall.....	14,806 27
Oct. 1..	Andrew Onderdonk..	190	Construction of Seawall.....	2,312 69
Oct. 24..	Andrew Onderdonk..	191	Construction of Seawall.....	24,000 00
Nov. 4..	Andrew Onderdonk..	192	Construction of Seawall.....	3,394 70
Nov. 4..	Andrew Onderdonk..	193	Construction of Seawall.....	6,716 48
Nov. 4..	Andrew Onderdonk..	194	Construction of Seawall.....	2,061 98
Nov. 4..	John N. Risdon.....	195	East St., from Ferry to Howard—on acc't.	5,000 00
Nov. 11..	W. J. Adams.....	196	Mission Wharf, No. 2—on account.....	5,000 00
Dec. 2..	Andrew Onderdonk..	197	Construction of Seawall.....	1,523 25
Dec. 2..	Andrew Onderdonk..	198	Construction of Seawall.....	6,536 44
Dec. 2..	Andrew Onderdonk..	199	Construction of Seawall.....	8,139 37
Dec. 16..	John N. Risdon.....	200	East St., from Ferry to Howard—on acc't.	15,000 00
Dec. 16..	W. J. Adams.....	201	Mission Wharf, No. 2—on account.....	8,000 00
1880.				
Jan. 6..	Andrew Onderdonk..	202	Construction of Seawall.....	1,204 95
Jan. 6..	Andrew Onderdonk..	203	Construction of Seawall.....	2,764 55
Jan. 6..	Andrew Onderdonk..	204	Construction of Seawall.....	9,643 50
Jan. 6..	John N. Risdon.....	205	East St., from Ferry to Howard St.....	8,185 92
Jan. 6..	W. J. Adams.....	206	Mission Wharf, No. 2.....	11,801 86
Jan. 6..	Andrew Onderdonk..	207	Construction of Seawall.....	25,000 00
Jan. 13..	W. J. Adams.....	208	Sewer under Wash'n St. Wharf—on acc't.	1,500 00
Feb. 5..	Andrew Onderdonk..	209	Construction of Seawall.....	98 25
Feb. 5..	Andrew Onderdonk..	210	Construction of Seawall.....	10,931 74
Feb. 5..	Andrew Onderdonk..	211	Construction of Seawall.....	3,182 63
Feb. 5..	Andrew Onderdonk..	212	Construction of Seawall.....	1,364 63
Feb. 25..	W. J. Adams.....	213	Sewer under Wash'n St. Wharf—on acc't.	5,276 37
March 2..	Andrew Onderdonk..	214	Construction of Seawall.....	9,726 85
March 2..	Andrew Onderdonk..	215	Construction of Seawall.....	5,487 07
March 2..	Andrew Onderdonk..	216	Construction of Seawall.....	297 18
March 2..	O. F. Graves.....	217	East St., south of Howard St.....	6,043 30
March 11..	W. T. Garratt.....	218	Extra work on two Hooker pumps for tug Governor Irwin.....	1,441 37
April 5..	Andrew Onderdonk..	219	Construction of Seawall.....	12,424 58
April 5..	Andrew Onderdonk..	220	Construction of Seawall.....	4,074 64
April 5..	Andrew Onderdonk..	221	Construction of Seawall.....	9,816 55
April 10..	Andrew Onderdonk..	222	Construction of Seawall.....	4,282 58
April 10..	Hancock & Kelso.....	223	Construction of Seawall.....	2,410 68
April 15..	W. L. Richardson.....	224	Repairs on Harrison St. Wharf.....	1,083 80
April 16..	Talcott & Onderdonk..	225	Extra work on new ferry slips.....	5,722 50
April 29..	W. L. Richardson.....	226	Driving piles at Harrison St. Wharf.....	731 15
May 4..	Andrew Onderdonk..	227	Construction of Seawall.....	12,445 82
May 4..	Andrew Onderdonk..	228	Construction of Seawall.....	4,399 55
May 4..	Andrew Onderdonk..	229	Construction of Seawall.....	536 62
May 4..	Hancock & Kelso.....	230	Construction of Seawall.....	3,402 91
May 4..	Andrew Onderdonk..	231	Construction of Seawall.....	12,593 44
May 18..	Andrew Onderdonk..	232	Construction of Seawall.....	1,065 19
May 18..	Andrew Onderdonk..	233	Construction of Seawall.....	17,407 85
May 25..	W. J. Adams.....	234	Lumber furnished.....	1,289 79
June 1..	Thos. Thomson & Co..	235	Widening Spear Street Wharf.....	6,629 95
June 2..	Hancock & Kelso.....	236	Construction of Seawall.....	5,777 71
June 2..	Andrew Onderdonk..	237	Construction of Seawall.....	27,161 33
Total.....				\$419,429 27
Balance in Fund July 1st, 1880.....				308,710 75
Grand total.....				\$728,140 02

## COMPARATIVE STATEMENT OF RECEIPTS AND DISBURSEMENTS.

Fiscal Year—From the Organization of the Commission	Receipts—From Dockage, Tolls, Wharfage, Rents, etc.	Expenses—Salaries, Commissioners, Secretary, Clerk (and law fees), Wharfinger, Collectors, Fuel, Rent, Printing, Stationery	Percentage per Year	Construction and Repairs—Building Wharves, Bulkheads, Sheds, etc., and Repairs on the same	Seawall	Dredging—All Dredging up to 1874 was done under Contract. Since by Commissioners	Purchase of Dredge, Scows, and Repairs	Miscellaneous	Remitted State Treasurer	Drawn from State Treasurer
1863-4	\$ 117,544 25	\$ 25,351 84	21.50	\$ 57,599 82				\$ 576 25	\$ 71,897 39	\$ 47,680 02
1864-5	117,393 66	32,439 10	18.28	80,875 15					123,365 23	62,334 82
1865-6	187,716 80	35,531 43	19.02	19,065 42		\$ 44,106 30			132,023 96	47,568 30
1866-7	336,409 36	41,233 95	11.95	88,525 78	83,607 00	10,300 00			268,573 45	64,345 94
1867-8	294,304 28	55,531 92	18.87	82,791 27	250,991 97	41,021 00		561 18	217,528 06	351,121 12
1868-9	287,890 53	52,130 47	18.41	38,779 83	262,323 13	32,338 00			212,532 07	310,213 27
1869-70	252,649 36	54,684 10	21.65	35,545 04	165,892 68	80,100 00			180,423 37	272,670 93
1870-1	148,917 63	37,722 65	25.37	53,693 31		35,258 00			96,097 20	73,914 13
1871-2	195,031 14	61,006 70	31.28	28,146 62		53,944 40			165,877 82	53,944 40
1872-3	190,330 47	69,888 63	36.50	78,776 28		32,293 20			91,012 59	80,640 23
1873-4	263,709 06	77,398 05	29.33	104,175 98	2,321 85	42,478 56	\$ 34,070 00	6,311 01	166,150 23	168,769 62
1874-5	373,541 72	68,617 14	18.37	209,540 80	1,078 25	33,835 71	3,725 00	924 99	245,369 00	189,519 17
1875-6	372,078 74	65,976 57	17.73	162,000 25		40,802 70		565 47	249,450 44	146,716 69
1876-7	448,087 25	79,208 85	17.68	284,023 05		25,232 91	15,351 45		310,909 33	266,661 37
1877-8	446,516 82	84,326 72	18.88	112,628 95	4,803 38	38,211 40	82,068 79	1,665 88	285,521 50	162,712 80
1878-9	466,420 55	97,162 63	20.83	164,560 55	107,091 87	69,454 68	3,948 84	595 50	274,370 87	241,764 39
1879-80	427,687 56	100,667 57	23.53	141,022 14	309,652 90	51,675 28	1,173 50	2,510 53	240,414 91	419,429 27
	\$ 4,954,552 81	\$ 1,039,451 91		\$ 1,751,750 24	\$ 1,108,029 53	\$ 622,075 37	\$ 140,340 58	\$ 14,174 43	\$ 3,271,747 42	\$ 2,963,036 67
								Balance in the treasury		308,710 75
										\$ 3,271,747 42

NOTE.—May 1st, 1872. Rates of dockage, tolls, wharfage, and rents were reduced 50 per cent. by Act of Legislature. Salaries of wharfingers and collectors were increased 25 per cent. by Act of Legislature approved 19th March, 1878.

## BALANCE SHEET.

*From November 4th, 1863, to June 30th, 1880.*

## RECEIPTS.

From dockage, tolls, wharfage, rents, etc. -----	\$4,984,532 81
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## DISBURSEMENTS.

Salaries of Commissioners, Secretaries, Engineers, Attorney, law fees, Wharfingers, Collectors, fuel, rent, printing, and stationery -----	\$1,039,451 91
Construction of Wharves, Sheds, etc. -----	1,751,750 24
Seawall (construction of) -----	1,108,029 53
Purchase and construction of Dredgers, Tugs, and Scows -----	140,340 58
Dredging (cost of) -----	622,075 37
Miscellaneous—Loss of coal, wheat, iron, etc., by falling of wharves -----	14,174 43
Cash in the treasury -----	308,710 75
	<u>\$4,984,532 81</u>

## CASH.

Dr.	
Amount remitted to the State Treasurer -----	\$3,271,747 42

## CASH.

Cr.	
By amount drawn from State Treasurer -----	\$2,963,036 67
Cash on hand in the treasury -----	308,710 75
	<u>\$3,271,747 42</u>

## STATEMENT OF COST OF DREDGING.

Fiscal Year ending—	Salary of Em- ployes.	Repairs	Coal.	Ship Chandlery and Water.	Miscellaneous— Including Dock- ing, Dredgers, Tugs, and Scaws.	Total.	Number Yards Dredged.	Worked—No. of Hours.	Cost per Cubic Yard—Cents.
June 30, 1875	\$11,663 97	\$10,362 99	\$8,639 00	\$1,386 64	\$1,301 25	\$33,835 71	302,429	2,348 3	10 76
June 30, 1876	11,332 98	7,639 43	8,224 04	1,660 85	1,905 74	31,363 19	342,638	2,634	9 36
June 30, 1877	11,980 99	4,041 44	5,971 71	1,582 10	1,676 79	25,253 03	280,197	2,478 1	9 16
June 30, 1878	17,188 80	7,372 48	7,754 86	2,666 37	3,032 55	38,214 40	423,654	3,080	9 16
June 30, 1879	26,201 70	14,963 90	11,755 12	5,443 70	1,289 60	60,454 68	843,879	4,694	7 36
June 30, 1880	27,202 59	8,824 19	11,115 11	4,184 65	318 75	51,645 29	749,011	4,323	6 86

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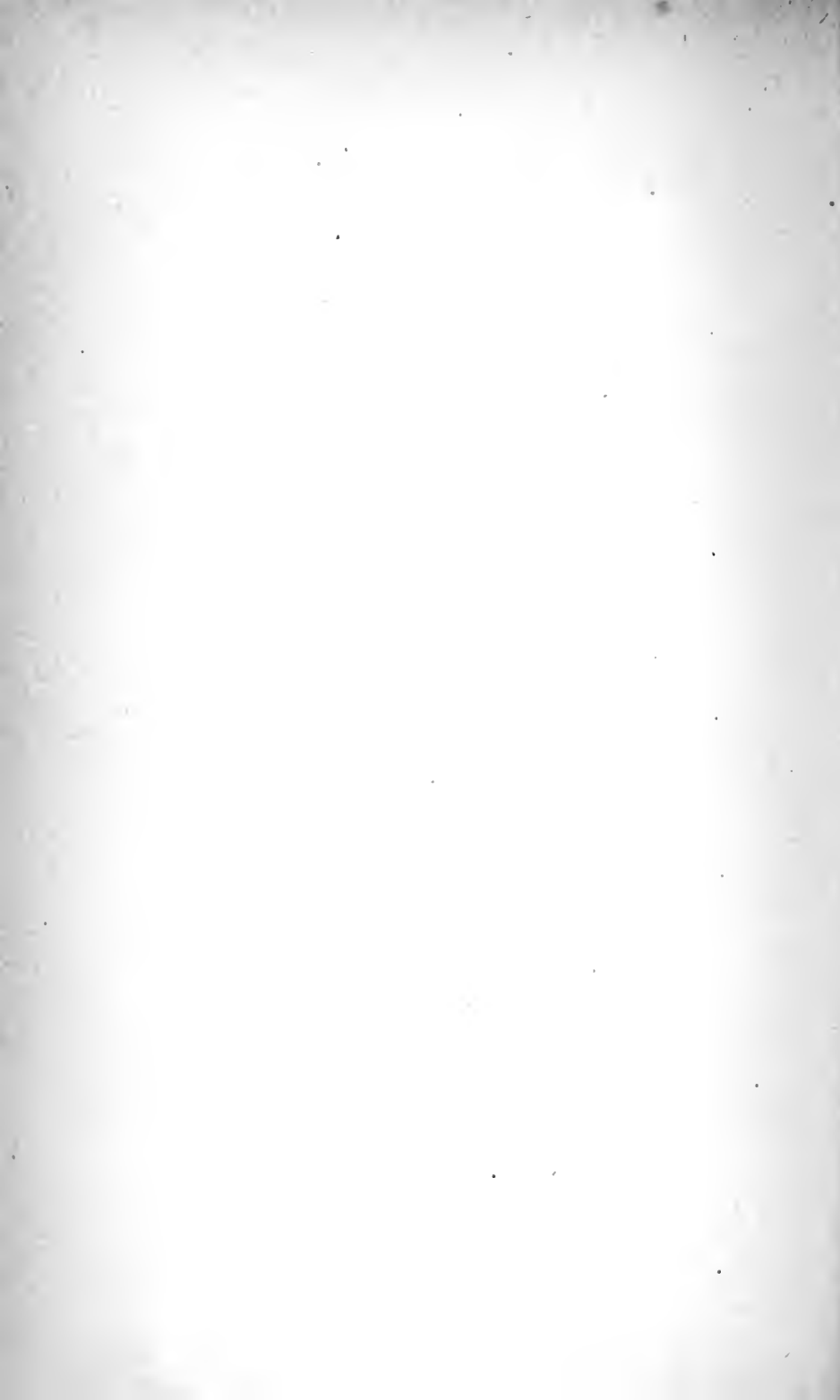
REPORT

OF THE

ATTORNEY OF THE BOARD.

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# REPORT.

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*To the Honorable Board of State Harbor Commissioners:*

The last report made to you concerning the state of the litigation of the Board, was made one year ago, by the late attorney, J. B. Lamar, Esquire.

Since that date considerable progress has been made in disposing of the matters on hand, but hardly as much as would have been made had not proceedings in the Courts been delayed by the change in system provided by the new Constitution, and by long and crowded calendars of cases under the old system.

The following statement gives the status of each case now in the hands of the attorney of the Board:

*The People of the State of California vs. The San Francisco Gaslight Company. Nineteenth District Court, No. 5,549, Reg. F.*

To recover thirty-four dollars dockage from defendant's vessel at Second and Berry Street Wharf. This action was brought to test defendant's right, under their lease from the State, to collect and retain the dockage at such wharf. Judgment for defendant, February fifteenth, eighteen hundred and seventy-eight. Plaintiff appealed to the Supreme Court June twentieth, eighteen hundred and seventy-eight.

Number in Supreme Court, 6,170. March second, eighteen hundred and eighty, judgment of the Court below affirmed.

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*Samuel Soule et al. vs. San Francisco Gaslight Company. Nineteenth District Court, No. 3,563, Reg. D.*

To recover three hundred and fifty dollars and interest from July, eighteen hundred and sixty-five, for coal landed at Second and Berry Street Wharf. The issue is whether any wharfage is legally chargeable on the coal, and if so, whether at the rate of six and a quarter or ten cents per ton.

In the lower Court, February fifteenth, eighteen hundred and seventy-eight, the plaintiffs had judgment for six and a quarter cents per ton. February twenty-third, eighteen hundred and seventy-eight, a stipulation was filed that the judgment herein should abide the result of an appeal to the Supreme Court in a similar case of the same title in this same Court. The report of that case, Number 3,849, follows.

*Samuel Soule et al. vs. The San Francisco Gaslight Company. Nineteenth District Court, No. 3,849, Reg. D.*

To recover one thousand seven hundred and fifty-nine dollars and sixty cents for wharfage on coal on Second and Berry Street Wharf. The issue in this case is precisely the same as in the case immediately preceding.

January tenth, eighteen hundred and seventy-eight, judgment for plaintiffs. May third, eighteen hundred and seventy-eight, case appealed to Supreme Court.

Number in Supreme Court, 6,175. The cause was argued and submitted in the Supreme Court, February seventeenth, eighteen hundred and eighty, and remanded, with directions to modify the judgment, March second, eighteen hundred and eighty, so that the plaintiffs recover ten cents per ton, instead of six and a quarter, as wharfage. This and the preceding case was settled by the payment to the Commissioners, on May twenty-fifth, eighteen hundred and eighty, of \$14,699 10.

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*The People of the State of California vs. The San Francisco Gaslight Company. Twelfth District Court, No. 21,695, Reg. T.*

To recover three hundred and twenty-four dollars wharfage at the Potrero wharf.

April twenty-second, eighteen hundred and seventy-eight, agreed statement of case filed. August twenty-third, cause submitted on briefs. December twenty-sixth, judgment for the plaintiffs. June twentieth, eighteen hundred and seventy-nine, the defendants appeal to the Supreme Court.

Number in Supreme Court, 6,676. February thirteenth, eighteen hundred and eighty, ordered to be heard in Department 2. Still pending in the Supreme Court.

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*The People vs. The San Francisco Gaslight Company. Nineteenth District Court, No. 4,455, Reg. E.*

To recover wharfage, dockage, etc., at the Potrero wharf, from eighteen hundred and seventy-four to eighteen hundred and seventy-five.

October thirtieth, eighteen hundred and seventy-six, complaint filed. June sixteenth, eighteen hundred and seventy-nine, judgment in favor of defendants, and notice of appeal by plaintiff to the Supreme Court.

Number in the Supreme Court, 6,667. February thirteenth, eighteen hundred and eighty, ordered to be heard in Department 2, and still pending in the Supreme Court.

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*The Pacific Transfer Company vs. Board of Harbor Commissioners. Twelfth District Court, No. 19,710, Reg. R.*

To recover two hundred and ninety-two dollars and twenty-five cents for wharfage paid under protest, and to restrain defendants

from collecting toll or wharfage from plaintiffs while in the transaction of their business of carrying baggage and passengers to and from steamers and vessels lying at the wharves.

June nineteenth, eighteen hundred and seventy-six, complaint filed. June twenty-ninth, demurrer filed. July twenty-fifth, demurrer sustained. August eighth, decree in favor of the defendants. August seventeenth, plaintiffs appeal to the Supreme Court.

Number in the Supreme Court, 5,308. August first, eighteen hundred and seventy-seven, no appearance in the Supreme Court for appellant. Argued for respondent and judgment affirmed. August sixth, by consent of counsel, judgment set aside and cause placed on the calendar. September twenty-fourth, argued and submitted. March twenty-sixth, eighteen hundred and seventy-eight, judgment reversed and cause remanded, with directions to overrule the demurrer.

The plaintiffs having commenced another action, covering similar ground, this case is probably concluded.

*The Pacific Transfer Company vs. The Harbor Commissioners. Twelfth District Court, No. 23,039, Reg. V.*

A similar case to the one immediately preceding. To recover money paid for wharfage by plaintiff to defendants.

June fifth, eighteen hundred and seventy-nine, complaint filed. June twelfth, demurrer filed. August eighteenth, demurrer sustained. October fourteenth, dismissal of action filed.

*The Pacific Transfer Company vs. William Blanding et al. Fourth District Court, No. 23,366, Reg. S.*

A similar case to the one immediately preceding. To recover money paid for wharfage by plaintiff to defendants.

October twenty-fourth, eighteen hundred and seventy-nine, complaint filed. December eleventh, eighteen hundred and seventy-nine, demurrer filed. January twenty-third, eighteen hundred and eighty, cause assigned to Department 6 of the Superior Court. March nineteenth, demurrer argued and sustained. March thirty-first, amended complaint filed. April nineteenth, demurrer filed. April twenty-third, demurrer argued and submitted. May twenty-fourth, demurrer overruled. May twenty-eighth, defendants demanded a bill of particular items, which plaintiff has so far failed to furnish. When it is furnished defendants will be ready to answer the complaint.

*Talcott and Onderdonk vs. The Harbor Commissioners. Nineteenth District Court, No. 6,191, Reg. G.*

To recover five thousand seven hundred and twenty-two dollars and fifty cents for work ordered done and performed by plaintiffs for defendants.

July twenty-third, eighteen hundred and seventy-eight, agreed statement of facts filed. July twenty-fifth, eighteen hundred and seventy-eight, judgment for plaintiffs. July twenty-seventh, defendants appeal to the Supreme Court.

Number in Supreme Court, 6,194. October fifth, in the Supreme Court, judgment reversed. November twelfth, in lower Court, cause dismissed without prejudice.

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*Talcott and Onderdonk vs. The Harbor Commissioners. Nineteenth District Court, No. 6,523, Reg. G.*

For the same cause of action and for same amount as preceding case.

November twelfth, eighteen hundred and seventy-eight, petition and order for writ of mandate filed. December nineteenth, judgment for defendants, and case appealed by plaintiffs to the Supreme Court.

Number in the Supreme Court, 6,194. In the Supreme Court, October fifth, eighteen hundred and seventy-nine, judgment reversed and cause remanded. In lower Court, March twenty-first, eighteen hundred and eighty, cause transferred to Department 4, Superior Court; demurrer overruled.

April sixth, eighteen hundred and eighty, judgment for plaintiffs for five thousand seven hundred and twenty-two dollars and fifty cents and costs.

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*Samuel Soule et al. vs. Andrew J. Pope and W. C. Talbot. Nineteenth District Court, No. 3,850, Reg. D.*

To recover nine hundred and twenty-four dollars and fifty cents wharfage on lumber landed by defendants and dockage on the steamer Constance, at Second and Berry Street Wharf, between March and November, eighteen hundred and seventy-five.

Complaint filed December eighth, eighteen hundred and seventy-five. January thirty-first, eighteen hundred and seventy-six, demurrer filed. February fourth, demurrer overruled. February twenty-ninth, answer filed. September twentieth, eighteen hundred and seventy-seven, case tried. January twenty-fifth, eighteen hundred and seventy-eight, judgment for defendants. March twelfth, eighteen hundred and seventy-eight, stipulation filed that judgment abide decision in the Supreme Court of a similar case, to wit.: Case No. 3,224 post, which see.

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*The People vs. Andrew J. Pope and W. C. Talbot. Nineteenth District Court, No. 4,642, Reg. E.*

To recover two thousand seven hundred and ninety-three dollars and eleven cents wharfage, etc. Same cause of action as in case No. 3,850 ante.

January twenty-seventh, eighteen hundred and seventy-seven, complaint filed. March eighth, demurrer filed. March sixteenth, demurrer overruled. April twenty-sixth, answer filed. January fourteenth, eighteen hundred and seventy-eight, case tried and sub-

mitted. January twenty-fifth, judgment for defendants. March twelfth, stipulation filed that judgment abide decision in Supreme Court of a similar case, to wit: Case No. 3,324 post, which see.

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*The People vs. Andrew J. Pope and W. C. Talbot. Justice's Court, No. 36,746, Reg. 23.*

To recover fifty-seven dollars and fifty cents dockage, etc. Same cause of action as in case No. 3,850 ante.

May twenty-first, eighteen hundred and seventy-eight, complaint filed and case continued indefinitely by agreement of counsel to abide decision of a similar case, to wit: Case No. 3,324 post, which see, in the State Supreme Court.

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*The People of the State of California vs. Andrew J. Pope and W. C. Talbot. Nineteenth District Court, No. 3,324, Reg. D.*

To recover three hundred and ninety-two dollars wharfage, etc. Same cause of action as in case No. 3,850 ante.

March seventeenth, eighteen hundred and seventy-five, complaint filed. March twenty-seventh, demurrer filed. April sixteenth, demurrer overruled. July ninth, answer filed. September thirtieth, tried and submitted. January twenty-fifth, eighteen hundred and seventy-eight, judgment for defendants. July twenty-fourth, plaintiffs appeal.

Number in Supreme Court, 6,200. This cause is now on the Supreme Court calendar awaiting hearing.

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*People vs. Turner, Kennedy & Shaw. Justice's Court, No. 30,557, Reg. 19.*

To recover two hundred and thirteen dollars and fifty cents wharfage.

Complaint filed May eighteenth, eighteen hundred and seventy-seven. Demurrer and answer filed June ninth, eighteen hundred and seventy-seven. April eighth, eighteen hundred and seventy-nine, papers transmitted to Twelfth District Court.

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*People vs. Turner, Kennedy & Shaw. Justice's Court, No. 28,969, Reg. 18.*

To recover one hundred and forty-nine dollars wharfage.

Complaint filed February fifteenth, eighteen hundred and seventy-seven. Answer filed February twenty-fourth, eighteen hundred and seventy-seven. Cause certified to the Twelfth District Court, February sixteenth, eighteen hundred and seventy-seven. April eighth, eighteen hundred and seventy-nine, papers transmitted to Twelfth District Court.

*People vs. San Francisco Stone Block Paving Co. Justice's Court, No. 29,836, Reg. 18.*

To recover one hundred and sixty-seven dollars and eighty-one cents wharfage.

April sixth, eighteen hundred and seventy-seven, complaint filed. Defendants have never been found by the Sheriff.

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*The People vs. F. S. Malone and Leander Quint. Justice's Court, No. 36,984, Reg. 23.*

To recover two hundred and twelve dollars and eighty-seven cents from defendants as sureties on bond of Nat. Boyce as Wharfinger.

Complaint filed June third, eighteen hundred and seventy-eight, and case still pending.

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*The People vs. Silas Caulkins et al. Fourth District Court, No. 22,220, Reg. R.*

Suit upon the bond of Caulkins, as Wharfinger, for money received and not paid over.

May sixth, eighteen hundred and seventy-eight, complaint filed. October eleventh, eighteen hundred and seventy-eight, judgment in favor of plaintiff entered.

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*J. Boese vs. Bark Sela. United States District Court, No. 2,251, in Admiralty.*

To recover certain dockage.

In this case the Harbor Commissioners intervened, and after due process the proceeding was ended by the collection of the amount due them and its payment to the Board.

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*William Blanding et al. vs. The Barkentine Victor. United States District Court, No. 2,345, Reg. 5.*

A libel for dockage in China Basin. Still pending and awaiting hearing.

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*Samuel Soule et al. vs. Benjamin Holliday, Jr. Nineteenth District Court, No. 2,631, Reg. C.*

To recover three hundred and ninety-five dollars and eighty-seven cents dockage on the steamer Pelican.

Complaint filed May eighth, eighteen hundred and seventy-four. In this case a default and judgment for the plaintiff was taken October twenty-fourth, eighteen hundred and seventy-six, and reopened by the defendants, December eighth, eighteen hundred and seventy-six. May eleventh, eighteen hundred and seventy-seven, the defendants filed a demurrer, which is still undisposed of.

The case is assigned to Department 7, Superior Court, where it is now pending.

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*The People vs. The Pacific Rolling Mills. Nineteenth District Court, No. 5,954, Reg. F.*

To recover wharfage on certain coal and iron landed at defendant's wharf at the Potrero.

May second, eighteen hundred and seventy-eight, cause submitted on agreed statement. December twenty-ninth, eighteen hundred and seventy-nine, judgment for defendants. December thirty-one, case appealed.

Number in Supreme Court, 6,927. Case is still pending on calendar of Supreme Court.

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*The People vs. H. F. Williams et al. Nineteenth District Court, No. 5,174, Reg. F.*

To recover one hundred and fourteen dollars and twenty-five cents. This is an agreed case to determine the right of the Board to collect dockage, wharfage, and tolls in Channel street, on the south side of Block 17. The case was argued October twelfth, eighteen hundred and seventy-seven, and decided in favor of defendant, December twenty-second, eighteen hundred and seventy-nine. The plaintiffs appealed.

Number in Supreme Court, 6,928. Case is still pending on the calendar of the Supreme Court.

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*The People vs. C. L. Dingley. Justice's Court, No. 28,968, Reg. 18.*

To recover one hundred and thirty-five dollars and fifty-five cents wharfage.

February fifteenth, eighteen hundred and seventy-seven, complaint filed. Further proceedings suspended by consent of counsel to await and abide by the decision in the Supreme Court of the case of the People vs. H. F. Williams et al.

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*The People vs. Thomas R. Huson et al. Fourth District Court, No. 22,221, Reg. R.*

To recover upon defendant's bond as Wharfinger.

May sixth, eighteen hundred and seventy-eight, complaint filed. July fifth, demurrer filed. July thirtieth, demurrer overruled. August fifteenth, answer filed. April fourteenth, eighteen hundred and seventy-nine, case tried. September twenty-fourth, judgment for defendants. November tenth, plaintiffs move for a new trial. January twenty-third, eighteen hundred and eighty, cause assigned to Department Seven, Superior Court. May fifth, motion for new trial denied. May twenty-first, notice of appeal filed.

*William Blanding et al. vs. Smith and Smith. Fourth District Court, No. 22,545, Reg. R.*

To recover upon a bond guaranteeing an asphaltum contract.

The complaint filed September twenty-eighth, eighteen hundred and seventy-eight. Demurrer filed October thirty-first, eighteen hundred and seventy-eight. Demurrer overruled, December thirteenth, eighteen hundred and seventy-eight. Answer filed, July twelfth, eighteen hundred and seventy-nine. January twenty-third, eighteen hundred and eighty, case assigned to Department Seven, Superior Court, where it now is on the calendar awaiting hearing.

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*Richard L. Floyd vs. William Blanding et al. Fourth District Court, No. 22,942, Reg. R.*

Plaintiff, as grantee from the State of a water lot, under the Act of March twenty-sixth, eighteen hundred and fifty-one, sought in this action to restrain the construction of a seawall in front of his lot on the new water-front line established September twelfth, eighteen hundred and seventy-seven.

Complaint filed April third, eighteen hundred and seventy-nine. Judgment for plaintiff, April twenty-second, eighteen hundred and seventy-nine. Defendants appealed April twenty-fourth, eighteen hundred and seventy-nine.

Number in the Supreme Court, 6,609. In the Supreme Court, judgment reversed, December twenty-second, eighteen hundred and seventy-nine. December twenty-ninth, eighteen hundred and seventy-nine, judgment recorded in favor of defendants.

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*C. A. Hooper and G. W. Hooper vs. F. P. Swett. Nineteenth District Court, No. 6,618, Reg. G.*

To restrain defendants from driving piles or building a wharf in Channel street, under a contract from the Harbor Commissioners.

Complaint filed December twenty-eighth, eighteen hundred and seventy-eight. January fourteenth, eighteen hundred and seventy-nine, intervention of the Board of Harbor Commissioners filed. April second, eighteen hundred and seventy-nine, answer filed. January twenty-third, eighteen hundred and eighty, cause assigned to Department Four, Superior Court. August ninth, eighteen hundred and eighty, case tried and submitted. September twenty-fourth, cause decided in favor of the defendant, thereby establishing the jurisdiction of the Board in Channel street.

The plaintiffs have given notice of a motion for a new trial.

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*The People vs. The Potrero and Bay View Railroad Company. Superior Court, Department 8, No. 80, Reg. 1.*

To obtain a judgment that certain piles and a bridge built by the defendant over and in Islais Creek, in the City and County of San Francisco, be adjudged a nuisance and abated.



January fourteenth, eighteen hundred and eighty, complaint filed. February third, demurrer filed. February twentieth, demurrer overruled. March fifth, demurrer withdrawn without prejudice. June first, demurrer filed. July twenty-third, demurrer argued and submitted. July thirty-first, demurrer overruled.

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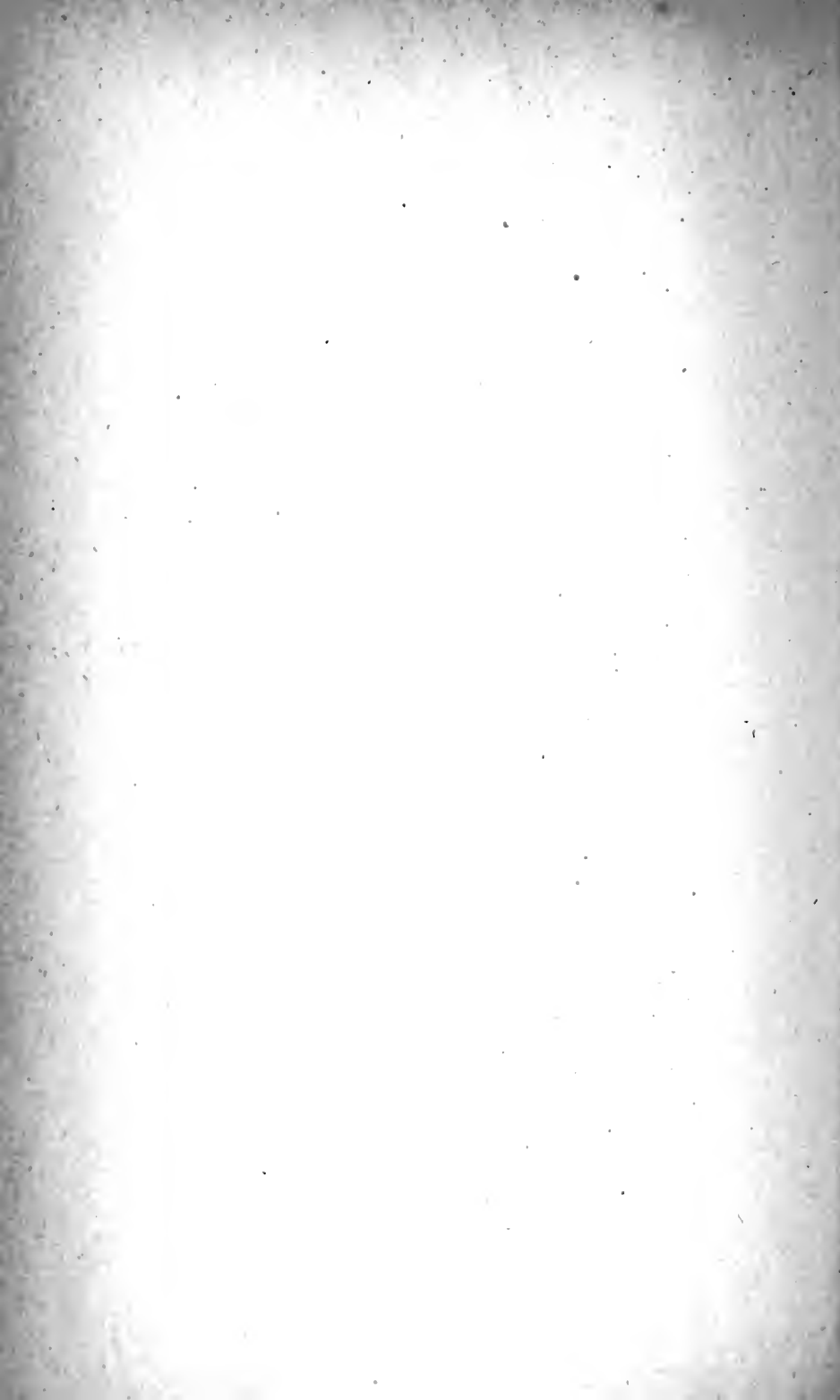
*The People vs. Thomas Boyce. Justice's Court, No. 1,389, Docket 2, p. 589.*

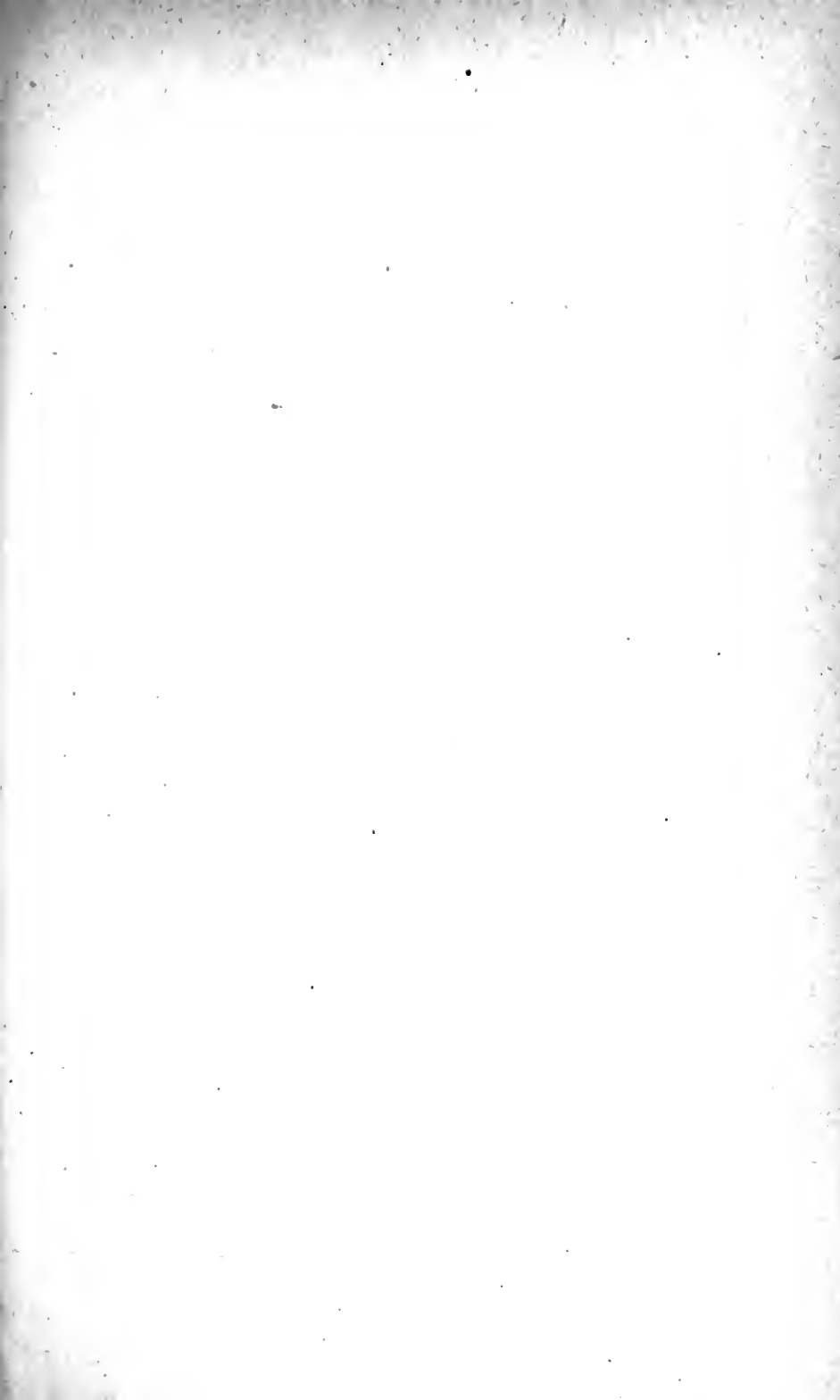
To recover the price of certain condemned hose sold to defendant.

July twenty-second, eighteen hundred and eighty, complaint filed. July twenty-third, attachment issued. August second, judgment for plaintiff for one hundred and fifty dollars principal, one dollar and seventy-five cents interest, and nine dollars costs. August third, execution issued and now in the hands of the Sheriff, who has levied on property to satisfy the judgment.

Respectfully submitted.

WM. W. MORROW,  
Attorney for the Board of State Harbor Commissioners.







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REPORT OF THE TRUSTEES

AND THE

Fifth Annual Report of the Resident Physician

OF THE

NAPA STATE ASYLUM FOR THE INSANE,

AT NAPA CITY, CALIFORNIA.

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1880.

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## OFFICERS OF THE ASYLUM.

### TRUSTEES.

BENJAMIN SHURTLEFF, M. D., PRESIDENT.....	Napa City.
J. C. MARTIN, Esq.....	Oakland.
A. G. BOGGS, Esq.....	Napa City.
F. E. JOHNSTON, Esq.....	Napa City.
N. D. RIDEOUT, Esq.....	Marysville.

### TREASURER.

C. B. SEELEY.....	Napa City.
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### RESIDENT OFFICERS.

E. T. WILKINS, M. D.....	Resident Physician.
L. F. DOZIER, M. D.....	Assistant Physician.
F. W. HATCH, JR., M. D.....	Assistant Physician.
J. B. STEVENS.....	Secretary.
J. M. PALMER.....	Steward.
J. T. JOHNSTON.....	Steward's Clerk.
MRS. E. F. AREY.....	Matron.
JOHN HAWKES.....	Supervisor.
ELIZA KENNEDY.....	Supervisoreess.
GEORGE R. WALDEN.....	Druggist.





# REPORT.

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To his Excellency GEORGE C. PERKINS,

*Governor of the State of California:*

The Board of Trustees of the Napa State Asylum for the Insane respectfully submit for your information and consideration a statement in detail of its expenditures for the fiscal year ending with the 30th day of June, A. D. 1880.

According to the last biennial report of the Board, there was a balance in the hands of its Treasurer, on account of the completion of the Asylum building, amounting to one hundred and ninety-nine dollars and fifteen cents. Since the date of that report, this sum has been expended in small amounts in making improvements in and about the buildings and grounds, and for which expenditures vouchers are on file in the office of the Treasurer.

The financial condition of the Medical Department of the Asylum is fully shown by reference to the report of the Treasurer, herewith submitted.

The general sanitary condition of the Asylum is shown by the report of the Resident Physician, appended hereto, and to which your attention is specially directed. Aside from the general statement therein contained, as to the needs and wants of this Asylum, the Board earnestly seeks your coöperation in obtaining an appropriation from the Legislature for the purpose of increasing the water supply for the institution. The present supply is entirely inadequate. It can be made abundant by the construction of suitable reservoirs. The State now owns eligible sites for the location of reservoirs, together with all necessary water privileges and riparian rights. It is hoped the Legislature will take some definite action on this subject.

The Board has been asked to audit the claims of several parties, as follows :

James Hunter & Co.....	\$739 20
Baker, Smith & Co.....	5,050 00
Noble & Gallagher.....	2,941 57
Wright & Sanders.....	11,115 69
Robert Ewing.....	5,328 10
Electrical Construction Company.....	766 15
W. W. Montague.....	918 72
Geo. J. Mothersole.....	189 68
Cox & Colby.....	2,388 43
E. L. Mayberry.....	6,184 56
Cox & Warren.....	2,015 18
W. F. Wilson & Co.....	1,770 90
Frear Stone Co.....	5,652 76
H. H. Knapp.....	1,405 92

Something of the nature of these claims is shown by the reports of the Board heretofore submitted. The claimants were the contractors for the erection of the Asylum buildings, their contracts being entered into with the State stipulating that they should be paid in gold coin. The Board, without serious loss to the State, was unable to pay gold coin. The contractors were paid Controllers' warrants—not worth their face at the time of payment. These warrants were received by the contractors on the assurance of the Board that the State would certainly pay them the difference between the actual value of these warrants and their face value. And this Board is of the opinion that fair and just dealing requires that these claims should be adjusted. If the Board had the funds it would promptly adjust them.

Respectfully,

BENJ. SHURTLEFF,  
J. C. MARTIN,  
A. G. BOGGS,  
F. E. JOHNSTON,  
N. D. RIDEOUT,  
Trustees.

## TREASURER'S REPORT.

*To the honorable Board of Trustees of the Napa State Asylum for the Insane:*

GENTLEMEN: I herewith present my report as Treasurer of said Asylum, for the fiscal year ending June 30th, 1880, covering receipts and expenditures on account of maintenance and construction for said year:

### THE TREASURER IN ACCOUNT WITH MAINTENANCE FUND FOR THE FISCAL YEAR ENDING JUNE 30TH, 1880.

<i>Receipts.</i>	
July 1, 1879, balance per last report.....	\$30,519 98
August, received from Dr. Wilkins.....	311 95
September, received from Dr. Wilkins.....	247 40
October, received from Dr. Wilkins.....	796 21
October, received from the State.....	9,500 00
November, received from Dr. Wilkins.....	278 85
December, received from the State.....	19,000 00
December, received from Dr. Wilkins.....	910 28
January, 1880, received from the State.....	20,000 00
January, received from Dr. Wilkins.....	235 85
February, received from Dr. Wilkins.....	1,078 55
February, received from the State.....	20,500 00
March, received from Dr. Wilkins.....	692 35
March, received from the State.....	10,500 00
April, received from Dr. Wilkins.....	686 85
April, received from the State.....	10,500 00
May, received from the State.....	7,333 33
May, received from Dr. Wilkins.....	688 05
June, received from the State.....	14,666 66
June, received from Dr. Wilkins.....	831 10
Total.....	<u>\$149,277 41</u>

<i>Expenditures.</i>	
Paid out on orders of the Board.....	\$133,386 04
July 1, balance on hand.....	<u>\$15,891 37</u>

### TREASURER IN ACCOUNT WITH CONSTRUCTION FUND FROM OCTOBER 1st, 1879, TO JUNE 30TH, 1880.

<i>Receipts.</i>	
October 1, 1879, balance on hand as per last report.....	\$199 15
<i>Expenditures.</i>	
Paid out on orders of the Board.....	\$197 11
July 1, 1880, balance on hand.....	<u>\$2 04</u>

Respectfully,

C. B. SEELEY,

Treasurer.

## RESIDENT PHYSICIAN'S REPORT

FOR THE

FISCAL YEAR ENDING JUNE 30TH, 1880.

*To the Board of Trustees:*

GENTLEMEN: The general transactions of the asylum, together with the movement of patients during the year ending June 30th, 1880, is hereby submitted to your honorable Board.

Under ordinary circumstances, this is all that would be necessary, but as the Legislature will again be in session next Winter, I presume the Board will consider it advisable to make its report to the Governor, rather in the spirit than the letter of the law that directs it to make a biennial report.

## ANNUAL SUMMARY.

The following summary exhibits the number of patients in the Asylum July 1st, 1879, number admitted, number under care and treatment, number discharged, eloped, and died during the year, and the number remaining in the Asylum July 1st, 1880.

## ANNUAL SUMMARY.

FROM JULY 1ST, 1879, TO JULY 1ST, 1880.	Males.	Females.	Totals.
Number of patients July 1st, 1879.....	450	264	714
Number admitted during the year*.....	400	172	572
Number under care and treatment.....	850	436	1,286
Number discharged recovered.....	139	50	189
Number discharged improved.....	68	52	120
Number discharged unimproved.....	22	12	34
Number discharged not insane.....	7	2	9
Number died.....	74	17	91
Number eloped.....	4	-----	4
Discharged, died, and eloped.....	314	133	447
Number remaining July 1st, 1880.....	536	303	839

There have been two suicides during the year.

Of those discharged, 309 had recovered or were sufficiently improved to justify their release from the Asylum; 34 were unimproved; 9 were not insane while here, and 4 eloped. There were 91 deaths, 74 males and 17 females, being 7.08 per cent. of the number treated. The year ended with 839 patients, 536 males and 303 females, an increase of 125 for the year, being 61 less than the increase of the preceding year.

\* Of the number admitted during the year, 50 had previously been in this Asylum, 25 in the Stockton Asylum, 11 in both this and the Stockton Asylum, and 10 had been in other asylums.

Of the 572 admitted during the year, 61 had previously been in this Asylum and 35 had been in other asylums.

Those discharged as not insane were either drunkards or feigners of insanity to escape punishment. Those who eloped were quiet, and apparently harmless persons who were given the privileges of the grounds, of which they took advantage and left without ceremony.

#### DEATHS.

Of those who died, 74 were men and 17 were women. This great disparity of death in the sexes will be readily understood by an examination of Table IX, which shows that consumption, general paresis, organic disease of the brain, and paralysis, were the causes of death in 40 men and only 4 women; the latter being comparatively free from attacks of these incurable diseases, while they are of very common occurrence among men. The small percentage of deaths, considering the class of patients, and character of diseases treated, the total absence of epidemics, and almost complete exemption from malarious diseases, attest the salubrity of the climate, and the healthfulness of the location. If any other proof is needed to establish this fact, it is only necessary to state, that among the officers and their families, the employés and attendants, in all comprising about 100 persons, there has been but little sickness and no death during the year. Of the 572 patients admitted during the year, 288 were from San Francisco, the remainder, 284, from 39 other counties; 363 were of foreign birth, and 209 were natives of the United States.

#### ANNUAL INCREASE.

The average annual increase, since the Asylum was opened, has been 167 $\frac{1}{2}$ . The increase during the last year—125—being the smallest. These, added to an already crowded Asylum, has sorely taxed our ingenuity, and has rendered proper classification more impossible than ever. The attics now being fitted up will, ere long, afford accommodations for nearly 200 patients; but as more than half of this space will be occupied before the close of the fiscal year ending June 30th, 1880, the question again arises as to what is to be done with the increase for the next two years, which no reasonable estimate can place at less than 250. To my mind the remedy is perfectly clear. Steps should be taken and appropriations made by the Legislature, soon to convene, for the construction of another Asylum, to be located in the First or Fourth Congressional District. Its pressing demands will be required long before it can possibly be completed, and we had as well, and better, meet the issue now as hereafter. There is nothing more certain in the future than that there will be not less than 1,200 patients in this Asylum at the end of the fiscal year ending June 30th, 1883. This will be just double the number that this Asylum was originally intended to accommodate, and many more than should ever be packed beneath one roof, and to store these away, even with tolerable comfort, it will, in addition to the sum necessary to defray the ordinary expenses of the Asylum, require an appropriation sufficient to carry out the recommendations in your last biennial report, viz.: the construction of a dam and reservoir on the Spencer Tract, now the property of the State, and from which pipes are already laid.

## INFIRMARIES.

The construction of two infirmaries, one for each sex, in which the sick and bed-ridden patients can be made more comfortable, and be better treated than it is possible amid the noise and confusion of the wards as at present arranged, is of the first importance.

In my report to Governor Haight, in 1871, after visiting the best asylums in the world, I recommended infirmaries as necessary adjuncts to any asylum that might be built; and at my suggestion they were made a part of the plan for this Asylum, but, unfortunately, were never built. I again renewed the recommendation in my last report to your honorable Board, and will continue to do so in each succeeding report, until the desired end shall have been accomplished.

Dr. John P. Gray, Superintendent of the State Lunatic Asylum at Utica, New York, in his last report to the Board of Managers of that Asylum, says: "I would call your attention to the importance of building a small wing or hospital for the special care of the more feeble and sick class of patients. Our arrangements for taking care of the sick, though probably as good as in other similar institutions, must be regarded as very imperfect. All sick patients should be immediately removed from the wards to a hospital department, properly arranged, when every attention demanded by their conditions could be bestowed. Where the physician could visit them frequently through the day, and in the night; if necessary, without disturbing others; where those very ill could be visited, and, if advisable, nursed by their friends. The experience of the great benefit of the small hospital wing for women makes the need of the one for the men seem more urgent."

The estimated cost for building, equipping, and finishing these infirmaries, for thirty patients each, is \$40,000 for the two, or \$750 for each patient to be accommodated.

## STABLE, BARN, AND COW SHEDS.

A stable and hay barn, a cow house and straw shed are the essentials of every well regulated farm, and should have been built long ago. We need them badly. It will require about \$10,000 to make these improvements for the accommodation of ten horses and thirty cows, and the feed necessary to their maintenance.

## FENCING.

The entire farm should be inclosed with a good, substantial fence; that around the garden should be seven feet high, with boards close together and set on end. The estimated cost for fencing is \$3,000.

## BASEMENT WINDOWS.

The basement windows should be glazed. As the radiators are all in the basement the saving in the cost of fuel would, in my opinion, soon defray the expense of this much needed outlay. With these 125 windows open, as at present, the air rushes in and renders it almost impossible to warm the building during the cold spells of Winter. During the four months of last season, beginning with

December and ending with March, our bills for fuel alone were nearly \$7,000. The estimated cost of this improvement is \$1,000.

#### SITTING-ROOMS.

I also think it would be both a matter of economy and a source of comfort to have sliding doors made to inclose the bay windows now used as sitting rooms in the wards, and furnishing them with stoves or steam coil, separate from the general heating apparatus of the hospital. At all events, this should be done in the wards on the ground floor, where the more helpless, infirm, and feeble patients are kept. The estimated cost for this improvement is \$350 for each ward.

#### ELEVATORS.

The elevators, or dumb waiters, by means of which the wards are served with food, are constructed of inflammable material, and in the event of fire, would act as conduits of flame to all the wards through which they pass. This was a great oversight in their construction, which I have frequently pointed out, both to your honorable Board and to legislative committees, but no action has thus far been taken to remedy this glaring defect. They can be made fireproof at a comparatively trifling cost, and, in my judgment, it would be almost criminal neglect further to delay this important change. There are five of these elevators in the Asylum, and to render them perfectly safe will cost about \$250 each, or \$1,250 in all, for the entire improvement.

#### PAINTING.

Many of the wards are sadly in need of a coat or two of paint, not only to prevent the absorption of effluvia, but render them neater and more attractive in appearance. In addition to this, the outer walls of the south side of the building, where exposed to the driving rains of Winter, should be painted; especially is this necessary with the frear stone coping and trimmings over the windows, and at the ends of the corridors. The sum of \$3,000 could be most advantageously expended for this purpose.

#### PARTITIONS.

Additional room can be provided for patients by putting partitions in the attendants' rooms in Wards A and B on the male, and Y and Z on the female side of the Asylum. Other rooms can also be constructed very cheaply in two of these wards, where small dormitories and a few more single rooms are greatly needed.

The attics over these wards can also be fitted up for the reception of patients, and when this shall have been done, the power of expansion in this Asylum will have reached its utmost limits. Eighty additional patients could be accommodated by these improvements at a cost of about \$10,000.

Should all of these improvements be made, in addition to those now being rapidly pushed to completion, we may be able to accommodate the increase of the insane for the next two fiscal years. Without them it would appear impossible.

## ADDITIONAL WATER TANKS.

Four additional water tanks are already needed, and will have to be constructed before the next dry season begins. This is a necessity that cannot longer be postponed without jeopardy to the best interests of the Asylum. They will cost \$500 each.

## TELEPHONE.

It is deemed important that there should be communication by telephone with the telegraph office in Napa City. It is of daily necessity to send a special messenger to Napa for some purpose, that would be avoided by the construction of a telephonic line. I recommend it to your consideration and trust it will be adopted. The cost would be about \$250.

## LODGE AND GATE.

A gate and a lodge for a Gatekeeper at the entrance of the avenue should be constructed immediately. The avenue will soon be completed, and nothing less than a handsome gate and comely lodge will comport with the broad and handsome avenue, the beautiful building, and spacious grounds.

## ADDITIONAL LAND.

The necessity for reclaiming the tule land on the Asylum tract becomes more pressing as the number of patients increase. At present we have no fall pasture for the dairy cows, and can have none until this land is reclaimed. Indeed, additional lands adjoining the Asylum tract would add much to the value of the entire Asylum property, and would materially aid in the economical management of the institution for all coming time. No asylum with 1,000 patients should have less than 500 acres of land, unless it be far more productive than that upon which this is located. I therefore call your especial attention to the importance of this suggestion.

The Asylum is located on a tract of 208 acres of land, a little less than two miles southeast of Napa City. It is situated on a plateau of land elevated about 40 feet above tide water, which covers the low lands of the tract. The sewerage facilities are therefore excellent, and have been availed of to the fullest extent. The small sewers are said to be made of the best quality of hydraulic cement, carefully laid to a line and of sufficient fall, the joints being put together with fine cement mortar, and made perfectly water-tight. They vary in size from 6 to 14 inches in diameter, being regulated by the quantity of soil calculated to pass through them. The soil pipes empty into these sewers, and they into the main sewer, which commences on the south side of the main central entrance, and continues down to the ravine on the south side of the Asylum property. It is 800 feet in length, egg shaped in section, 4 feet high, and 2 feet 6 inches in the widest part. The wall is 8 inches thick all around, built with the best quality of hard burnt bricks, well bedded in cement mortar, and laid throughout with a current of at least 3 inches in 10 feet. From the end of the main sewer, the sewerage is conveyed in pipes underground 1,000 feet further, where it is turned upon the garden land, and finally finds its way into tide water.



The Asylum faces the west, and consists of a center building with wings extending on each side, and are exactly alike, the divisions for the sexes being equal; twelve wards on each side, exclusive of one ward on the fourth floor of the center building, and one in the attic over the same, the two being occupied by 100 male patients.

The style of the architecture is domestic gothic, being the best adapted to the site, and with its numerous projections and towers, the hills and trees in the background, the tastily laid out grounds in front, dotted with arbors and shrubs, adorned with flower beds, and approached by a broad and spacious avenue, which is lined by three rows of trees on either side, gives a very attractive and pleasing effect to the whole. The natural ventilation to the hospital is all that could be desired, every room having a large window communicating with the outside air. The ventilation of the closets, however, is defective, and can and should be remedied. The soil pipes should be continued through the roof above, and ventilating shafts constructed to convey the foul air from every closet, urinal, and bath room in the Asylum. This can be done at comparatively small expense, and it is confidently believed the next Legislature will make an appropriation for this necessary improvement.

The water is remarkably good, and free from impurities, as will be seen from the following analysis by Professor Hanks:

Mr. Hanks, the chemist, says:

I find this water to be remarkably free from impurities, as the following statement will show: The water is transparent, free from color, containing but a small quantity of suspended matter, which quickly subsides when the water is allowed to stand; it is very slightly alkaline, and a portion of the fixed ingredients is in the state of bicarbonates.

A microscopic examination shows the suspended matter to be principally vegetable, and the forms revealed are those common in good water when it is allowed to stand for a time in reservoirs or tanks.

The total fixed constituents in this water were found to be 11.08 grains in one United States wine gallon, which is equal to 13.3 grains in one Imperial gallon, 0.190 grammes to the litre, and to 19.0 parts in 100,000.

The hardness is equal to 3.7 grains of carbonate of lime in an Imperial gallon, or 5.29 parts in 100,000. From organic matter, both in the form of ammonia and albuminoid matter, it is singularly free, showing only traces.

The constituents found, and which it was thought necessary to determine quantitatively, are as follows: Carbonic acid, chlorine, phosphoric acid (trace), boracic acid (trace), iron, lime, silica, soda, and magnesia.

As the result of my examination, I have no hesitation in pronouncing this water to be good and in every way fitted for domestic use. It is remarkably soft, free from sulphate of lime, contains only a small quantity of fixed ingredients, and is free from mechanical impurities, which properties render it in every way suitable for manufacturing purposes.

HENRY G. HANKS.

It is greatly to be regretted, however, that the quantity is entirely insufficient for irrigating purposes, and until the supply shall be increased by the construction of a reservoir, no green lawns can adorn the otherwise beautiful grounds of the Asylum. There is upon one of the tracts of land belonging to the State a splendid place to construct a dam, and make a reservoir that would furnish all the water that could be desired, and with its aid this can certainly be made one of the most attractive and beautiful places in the State. Let us hope it will not be long ere this coveted boon will be granted to this institution.

#### STEWARD'S REPORT.

The first table of the Steward's report contains an itemized account of articles purchased and consumed, and other expenses for the fiscal

year, ending June 30th, 1880. The second shows the cost of the different departments. The third, a monthly statement of the average number of patients daily; average daily expenses; average cost per capita per day, and average cost per month. The fourth shows the aggregate disbursements, and the fifth, the products of the farm, garden, and dairy.

To these tables I invite your especial attention, as all that pertains to the economical and financial management of the institution is contained in them. The per capita expense, 42 $\frac{1}{2}$  cents per day, is remarkably low, indeed too low to be considered a precedent for the future, as contracts for all supplies were obtained at unusually low rates. In making estimates for the next two fiscal years I have therefore placed the probable cost of maintenance at 45 cents per day per capita, which I think as low as the dictates of prudence will justify. \$5,739 12 was expended for furniture for the 125 patients added to our list during the year, which is at the rate of \$45 91 for each additional patient. \$350 was paid for a team to aid in doing the work upon the farm and grounds, and \$800 upon the improvement of the grounds.

No appropriation was made for this purpose by the last Legislature, but the immense amount of work done by the patients during the year, alike to their own benefit and the benefit of the State, could not have been accomplished without this small expenditure, which was taken from the maintenance fund, but like the furnishing account, not included in the per capita expense.

It is to be hoped, and I have reason to believe, that the incoming Legislature will treat us more liberally than the last, and make us a generous appropriation for the improvement of the grounds.

Our patients have done a great deal of work, though employed only four hours a day, and many of them seem as much interested in the improvements going on as if the place belonged to them.

But it is not alone upon the grounds that the patients have lent us a helping hand, since by their labor the vegetables are cultured and raised. It is by their help too that most of the work in the laundry and sewing room is done. They aid, too, in the kitchen and bakery, in the boiler house and carpenter shop, in taking care of the horses and milking the cows, in taking care of the pigs and poultry, and in many and divers ways assist in doing work on the wards.

For all this they should be rewarded and encouraged, amused and entertained, which we do to the best of our ability. Our weekly entertainments still continue, but we should be supplied with a magic lantern for their amusement, with pictures to hang upon the walls, and cheap books and periodicals for them to read, to occupy their time and divert their minds. We often hear of *philanthropists* taking great interest in the comfort and welfare of the inmates of the State Prison, and have wondered why they should so completely ignore the poor unfortunate people committed to our care. I would like for some of them to answer if they can, and would like still better to be remembered by our friends soon to assemble at the Capitol. A thousand dollars could be most judiciously and benevolently expended for these people in this way, and would produce good results.

#### THE ROOF NOT CONSIDERED SAFE.

I am informed by the carpenters, now at work in fitting up the attics, that the timbers used in the construction of the roof are not as

strong as they should have been, and that sufficient care was not taken in the framing and putting it together. In some places the walls have been pushed out; and, in other respects, defects have been noticed. I call your attention to the matter now, that you may make such examination and take such action as may be deemed proper.

#### GENERAL REMARKS.

The medical and moral treatment of the patients, and the general management of the Asylum, are conducted on the same principles as set forth in my last report; and it is not deemed necessary, at this time, to enlarge upon what was then said. The officers, employes, and attendants have, in the main, performed their respective duties with fidelity, alacrity, and good cheer, and have been fully up to my expectations in most instances. It would be expecting too much in the perfection of human nature to require all to be equal to the best, or to be disappointed because some unfortunate selections are made. Many really good men and women, who perform the ordinary duties of life, and come highly recommended for integrity and industry, make but indifferent attendants upon the insane, and often place us in embarrassing positions, because we dislike to discharge good people, though not quite up to the mark. Among so great a number there will always be found some of this class. There is still another class, that will occasionally work themselves into positions in every public institution—they are “busy-bodies,” who bring mischief with them when they come, and invariably endeavor to make mischief when they leave. They are generally plausible persons, having a perfect contempt for honorable acts or truthful speech. We have had some of these here, and probably will have, till human nature shall have changed and become less corrupt than when the Savior of the world made selection of His twelve apostles. He, in His wisdom, selected Judas for a purpose—that future generations, through all coming time, might know that at least one man out of every twelve would disregard the truth and be dishonest. But when we, in our ignorance, are so unfortunate as to select such persons, it is not for a purpose, but because we have been deceived and imposed upon. I am glad to say, however, that I have no reason to believe we have had any more than our due proportion of this class among us.

#### OBLIGATIONS.

Our thanks are due to the publishers of the following newspapers, for their contributions: Sacramento Daily Bee, Spirit of the Times, Signs of the Times, Mining and Scientific Press, Pacific Rural Press, Union Democrat. Also, to R. H. Taylor, Esq., for numerous packages of papers and magazines. To J. F. Lamdin, Esq., for a number of copies of the Ladies' Repository.

These favors are highly appreciated by the inmates, and add much to their entertainment.

The manager of Cole's Circus kindly extended an invitation to those of the inmates who could do so, to attend an afternoon performance at Napa City, and about eighty of them, in company with their attendants, accepted the invitation, and were highly delighted.

In conclusion, I must again express my gratitude for the success which has marked the operations of the institution during the year.

It gives me much pleasure to acknowledge my indebtedness to the officers of the Asylum for their efficiency in the discharge of their duties, and also to the employés who have so faithfully performed their part.

And, finally, gentlemen, allow me to express to you my appreciation of your uniform courtesy, kindness, and advice so generously bestowed at all times.

E. T. WILKINS, M. D.,  
Resident Physician.

NAPA CITY, August 10th, 1880.

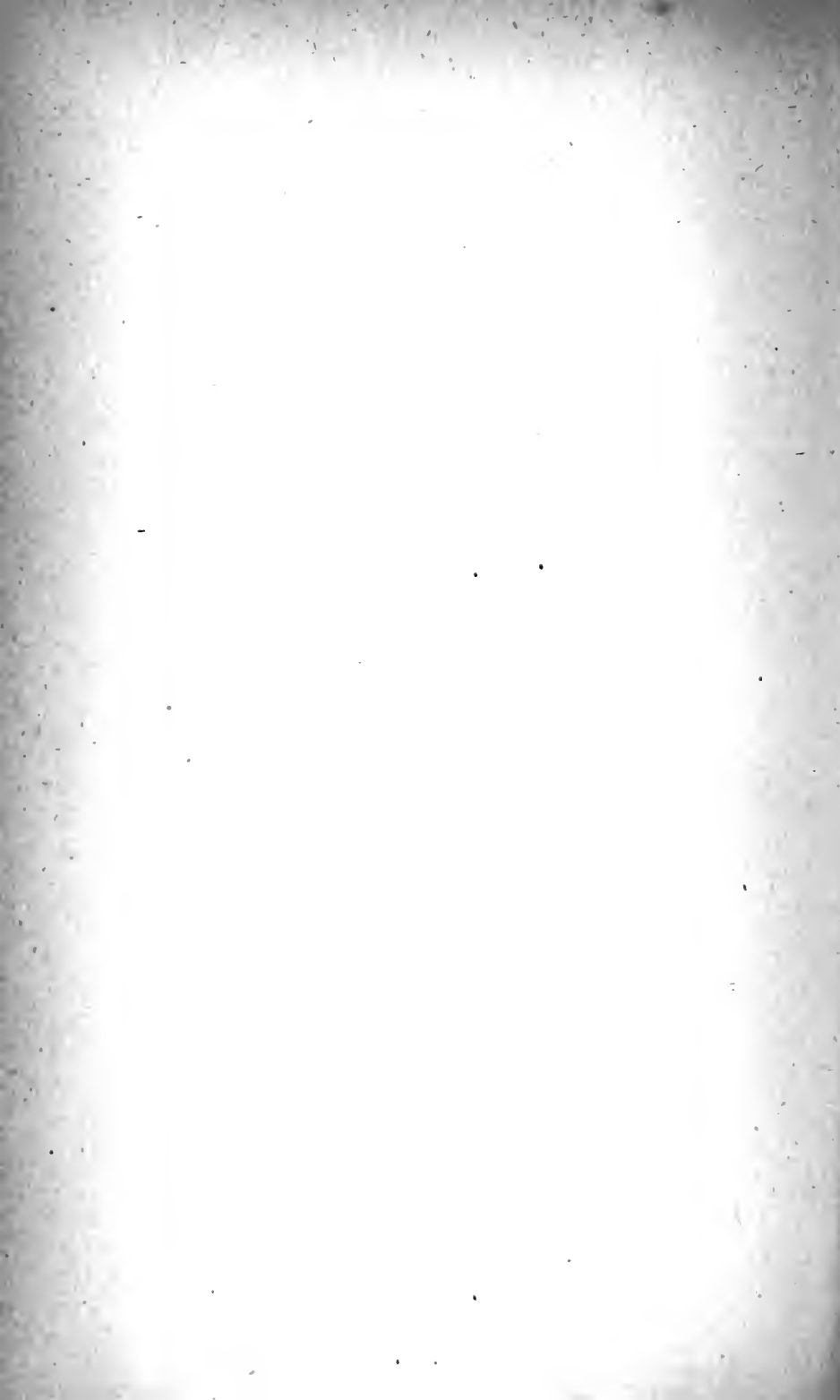
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# APPENDIX.

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# APPENDIX.

## NUMBER OF ADMISSIONS, RECOVERIES, DEATHS, ETC.

The following table exhibits the number of admissions, recoveries, discharges, deaths, elopements, number resident at the close of each year, the increase for each year, whole number treated each year, and in the aggregate; also, the ratio of recoveries and deaths each year, and for the whole time, from November 15th, 1875, to June 30th, 1880:

YEARS.	Admissions-----	Recoveries-----	Discharged mented-----	Deaths-----	Escaped-----	Number Resident at close of each year-----	Increase-----	Whole number treated-----	Per cent. of Recoveries to Admissions-----	Per cent. of deaths on number treated-----
November 15th, 1875, to July 1st, 1876-----	321	69	20	20	4	208	208	321	21.49	6.23
July 1st, 1876, to July 1st, 1877-----	451	140	71	49	4	395	187	659	31.04	7.43
July 1st, 1877, to July 1st, 1878-----	433	148	71	70	11	528	133	828	34.11	8.45
July 1st, 1878, to July 1st, 1879-----	615	184	133	104	8	714	186	1,143	29.91	8.22
July 1st, 1879, to July 1st, 1880-----	572	189	163	91	4	839	125	1,286	31.29	7.08
Totals-----	2,392	730	458	334	31	-----	839	-----	-----	-----

TABLE I.

*Showing the counties from which five hundred and seventy-two patients were admitted from July 1, 1879, to July 1, 1880.*

COUNTIES.	Males.	Females.	Total.
Alpine.....	1	—	1
Alameda.....	30	13	43
Amador.....	1	—	1
Butte.....	7	1	8
Colusa.....	5	3	8
Contra Costa.....	9	1	10
Del Norte.....	1	—	1
El Dorado.....	2	1	3
Humboldt.....	5	1	6
Inyo.....	2	—	2
Lake.....	1	2	3
Lassen.....	1	—	1
Los Angeles.....	13	3	16
Marin.....	3	1	4
Modoc.....	1	—	1
Mono.....	3	—	3
Monterey.....	3	2	5
Napa.....	10	2	12
Nevada.....	6	—	6
Placer.....	4	1	5
Plumas.....	1	—	1
Sacramento.....	28	11	39
San Benito.....	2	—	2
San Diego.....	2	—	2
San Francisco.....	182	106	288
San Luis Obispo.....	2	1	3
San Mateo.....	4	2	6
Santa Barbara.....	1	2	3
Santa Clara.....	23	4	27
Santa Cruz.....	6	—	6
Shasta.....	5	—	5
Siskiyou.....	3	2	5
Solano.....	6	4	10
Sonoma.....	10	3	13
Sutter.....	—	2	2
Tehama.....	5	—	5
Trinity.....	3	—	3
Ventura.....	1	—	1
Yolo.....	7	1	8
Yuba.....	1	3	4
Totals.....	400	172	572



TABLE II.

*Showing the nativity of five hundred and seventy-two patients, admitted from July 1, 1879, to July 1, 1880.*

NATIVITY.	Males.	Females.	Total.
<i>United States.</i>			
Alabama.....	1	—	1
Arkansas.....	2	—	2
California.....	26	14	40
Georgia.....	1	—	1
Illinois.....	5	2	7
Indiana.....	3	1	4
Iowa.....	4	—	4
Kentucky.....	1	—	1
Louisiana.....	3	2	5
Maine.....	2	4	6
Maryland.....	2	1	3
Massachusetts.....	12	8	20
Michigan.....	3	—	3
Minnesota.....	—	1	1
Mississippi.....	1	—	1
Missouri.....	10	3	13
New Jersey.....	2	1	3
New Hampshire.....	3	1	4
New York.....	26	10	36
Ohio.....	8	6	14
Oregon.....	—	2	2
Pennsylvania.....	7	2	9
Rhode Island.....	4	—	4
South Carolina.....	1	—	1
Tennessee.....	1	1	2
United States.....	5	2	7
Vermont.....	6	1	7
Virginia.....	2	—	2
Wisconsin.....	2	2	4
Totals.....	143	64	207
<i>Foreign Countries.</i>			
Australia.....	4	1	5
Austria.....	2	—	2
At Sea.....	1	—	1
Azores Islands.....	2	—	2
Bavaria.....	1	—	1
Belgium.....	—	1	1
Brazil.....	1	—	1
British America.....	1	—	1
British Columbia.....	1	—	1
Canada.....	10	2	12
Canary Islands.....	—	1	1
Chili.....	3	—	3
China.....	20	1	21
Costa Rica.....	1	—	1
Denmark.....	9	—	9
England.....	16	9	25
Finland.....	1	—	1
France.....	7	6	13
Germany.....	39	22	61
Holland.....	1	—	1
Ireland.....	85	40	125
Italy.....	8	1	9
Mexico.....	6	7	13
New Brunswick.....	—	5	5
Norway.....	2	—	2
Amount carried forward.....	231	96	317

TABLE II—Continued.

NATIVITY.	Males.	Females.	Total.
Amount carried forward.....	231	96	317
Nova Scotia.....	1	1	2
Poland.....	1	—	1
Portugal.....	1	—	1
Prussia.....	8	1	9
Russia.....	1	—	1
Sandwich Islands.....	1	—	1
Scotland.....	2	1	3
Spain.....	—	1	1
Sweden.....	3	3	6
Switzerland.....	5	2	7
Turkey.....	1	—	1
Unknown.....	10	3	13
Totals.....	255	108	363
<i>Territories.</i>			
Arizona.....	1	—	1
Idaho.....	1	—	1
Totals.....	2	—	2

## RECAPITULATION.

NATIVITY.	Males.	Females.	Total.
United States.....	143	64	207
Foreign countries.....	245	105	350
Territories.....	2	—	2
Unknown.....	10	3	13
Totals.....	400	172	572

TABLE III.

*Showing the ages of five hundred and seventy-two patients at the time of their admission in the Asylum, from July 1, 1879, to July 1, 1880.*

AGES.	Males.	Females.	Total
Between 1 and 10 years.....	2	1	2
Between 10 and 20 years.....	22	14	36
Between 20 and 30 years.....	82	35	117
Between 30 and 40 years.....	118	48	166
Between 40 and 50 years.....	85	44	129
Between 50 and 60 years.....	56	24	80
Between 60 and 70 years.....	16	2	18
Between 70 and 80 years.....	4	1	5
Between 80 and 90 years.....	1	—	1
Unknown.....	15	3	18
Totals.....	400	172	572

TABLE IV.

*Showing the supposed cause of insanity in five hundred and seventy-two patients, as stated in commitments, from July 1, 1879, to July 1, 1880.*

SUPPOSED CAUSES.	Males.	Females.	Total.
Business trouble .....	13		13
Change of life .....		11	11
Child-birth .....		2	2
Death of children .....		5	5
Death of wife .....	1		1
Disappointment .....	1	1	2
Disordered menstruation .....		5	5
Domestic trouble .....	8	8	16
Epilepsy .....	26	8	34
Erysipelas .....	1		1
Excessive venery .....		1	1
Exposure .....	1		1
Grief .....	1	5	6
Hereditary .....	13	8	21
Ill health .....	6	4	10
Injury to head .....	9	2	11
Intemperance .....	31	7	38
Jealousy .....	1	2	3
Loss of money .....	3	2	5
Masturbation .....	25		25
Old age .....	3	1	4
Overwork .....	3	1	4
Paralysis .....	5	1	6
Poverty .....	2		2
Puerperal condition .....		2	2
Religion .....	14	3	17
Sexual indulgence .....	2		2
Softening of brain .....	2		2
Spiritualism .....	1	1	2
Sunstroke .....	1		1
Syphilis .....	5		5
Typhoid fever .....	1		1
Unknown .....	221	86	307
Use of opium .....		1	1
Uterine trouble .....		5	5
Totals .....	400	172	572

TABLE V.

*Showing the class of insanity of five hundred and seventy-two patients, at the time of admission, as stated in commitments, from July 1, 1879, to July 1, 1880.*

CLASS.	Males.	Females.	Total.
Dementia .....	64	14	78
Dipsomania .....		1	1
Idiocy .....	3	2	5
Imbecility .....	4	2	6
Mania .....	225	102	327
Melancholia .....	25	13	38
Monomania .....	42	22	64
Nymphomania .....		2	2
Puerperal mania .....		5	5
Senile dementia .....	1	1	2
Unknown .....	36	8	44
Totals .....	400	172	572

TABLE VI.

*Showing the civil condition of five hundred and seventy-two patients, admitted from July 1, 1879, to July 1, 1880.*

CIVIL CONDITION.	Males	Females.	Total.
Divorced .....		2	2
Married .....	106	91	197
Single .....	261	56	317
Unknown .....	20	3	23
Widows .....		20	20
Widowers .....	13		13
Totals .....	400	172	572

TABLE VII.

*Showing the occupation of five hundred and seventy-two patients, admitted from July 1, 1879, to July 1, 1880.*

OCCUPATION.	Males.	Females.	Totals.
Bakers.....	6	—	6
Barbers.....	2	—	2
Barkeepers.....	3	—	3
Blacksmiths.....	5	—	5
Boiler makers.....	1	—	1
Bookbinders.....	1	1	2
Bookkeepers.....	5	—	5
Bootblacks.....	1	—	1
Bricklayers.....	2	—	2
Brick molders.....	1	—	1
Butchers.....	3	—	3
Cabinetmakers.....	2	—	2
Candy makers.....	1	—	1
Carpenters.....	13	—	13
Carriage makers.....	1	—	1
Clerks.....	9	—	9
Convicts.....	1	1	2
Cooks.....	7	1	8
Coopers.....	3	—	3
Coppersmiths.....	1	—	1
Dairymen.....	1	—	1
Domestics.....	—	22	22
Editors.....	1	—	1
Engineers.....	3	—	3
Expressmen.....	1	—	1
Farmers.....	26	1	27
Fishermen.....	1	—	1
Florists.....	—	1	1
Gardeners.....	7	—	7
Goldsmiths.....	1	—	1
Hatters.....	1	—	1
Horseshoers.....	1	—	1
Hostlers.....	2	—	2
Hotel keepers.....	3	—	3
Hotel runners.....	1	—	1
Housewives.....	—	90	90
Junk dealers.....	1	—	1
Laborers.....	94	—	94
Lawyers.....	2	—	2
Locksmiths.....	3	—	3
Longshoremen.....	1	—	1
Laundress.....	—	1	1
Laundrymen.....	1	—	1
Machinists.....	1	—	1
Marble cutters.....	2	—	2
Mechanics.....	1	—	1
Merchants.....	2	—	2
Metal roofers.....	1	—	1
Millers.....	1	—	1
Miners.....	24	—	24
Mining engineers.....	1	—	1
Ministers.....	1	—	1
Musie teachers.....	1	1	2
No occupation.....	33	28	61
Nurses.....	—	1	1
Painters.....	6	—	6
Peddlers.....	3	—	3
Physicians.....	3	—	3
Plasterers.....	2	—	2
Plumbers.....	1	—	1
Amount carried forward.....	302	148	450

TABLE VII—Continued.

OCCUPATION.	Males.	Females.	Totals.
Amount brought forward.....	302	148	450
Porters.....	3	—	3
Poultry dealers.....	1	—	1
Pressmen.....	1	—	1
Printers.....	6	1	7
Ragpickers.....	1	—	1
Ragpickers.....	2	—	2
Real estate agents.....	1	—	1
Saddlers.....	1	—	1
Sailors.....	19	—	19
Saloon keepers.....	3	—	3
School teachers.....	2	—	2
Seamstresses.....	—	2	2
Seamstresses.....	—	5	5
Servants.....	2	8	10
Sheep herders.....	9	—	9
Ship caulkers.....	1	—	1
Ship carpenters.....	4	—	4
Shoemakers.....	4	—	4
Soldiers.....	8	—	8
Stationers.....	1	—	1
Stevedores.....	1	—	1
Stewards.....	1	—	1
Stock raisers.....	2	—	2
Students.....	1	1	2
Teamsters.....	1	—	1
Truss makers.....	1	—	1
Unknown.....	16	7	23
Upholsterers.....	1	—	1
Vaqueros.....	1	—	1
Waiters.....	1	—	1
Wheelwrights.....	1	—	1
Wood carvers.....	2	—	2
Wool graders.....	1	—	1
Totals.....	400	172	572

TABLE VIII.

*Showing the cause of death of ninety-one patients from July 1, 1879, to July 1, 1880.*

Month.	CAUSE OF DEATH.	Nativity.	Age.	Males	Females
July, 1879	Paralysis	Ireland	56	1	---
July, 1879	Paralysis	Ireland	50	1	---
July, 1879	Apoplexy	Ireland	26	1	---
July, 1879	Pulmonary congestion	Ireland	28	1	---
July, 1879	Old age	Vermont	67	1	---
July, 1879	Paralysis	Germany	50	1	---
July, 1879	Paralysis	New York	39	1	---
July, 1879	Organic disease of brain	Ireland	35	1	---
August, 1879	Suicide	Norway	46	1	---
August, 1879	Injuries received from a fall	Ireland	23	1	---
August, 1879	Organic disease of heart	New York	28	1	---
August, 1879	Paralysis	New York	48	1	---
August, 1879	Apoplexy	Germany	33	1	---
August, 1879	Organic disease of brain	Western Islands	38	1	---
August, 1879	General debility	Illinois	53	---	1
September, 1879	Paralysis	Pennsylvania	55	1	---
September, 1879	Softening of brain	Denmark	35	1	---
September, 1879	General paresis	Ireland	36	1	---
September, 1879	Chronic hepatitis	Maine	26	1	---
October, 1879	Exhaustion	Ireland	59	---	1
October, 1879	Maniacal exhaustion	Prussia	47	1	---
October, 1879	Effects of a scald	Virginia	42	1	---
October, 1879	Inanition	Canada	57	---	1
October, 1879	Consumption	Germany	21	1	---
October, 1879	Unknown	Unknown	Unknown	1	---
October, 1879	Cerebral congestion	Ireland	32	1	---
November, 1879	Exhaustion	Maryland	51	1	---
November, 1879	Maniacal exhaustion	United States	40	---	1
November, 1879	Paralysis	Norway	51	1	---
November, 1879	Consumption	Tennessee	45	1	---
November, 1879	Consumption	Ireland	52	1	---
November, 1879	Organic disease of brain	New Hampshire	29	1	---
November, 1879	Heart disease	Italy	53	1	---
December, 1879	Maniacal exhaustion	Ireland	50	---	1
December, 1879	Cerebral congestion	China	Unknown	---	1
December, 1879	Exhaustion	Ireland	65	1	---
December, 1879	Suicide	Germany	33	1	---
December, 1879	Paralysis	Pennsylvania	62	1	---
December, 1879	Consumption	Austria	27	1	---
December, 1879	General paresis	England	37	1	---
December, 1879	Apoplexy	Ireland	40	1	---
December, 1879	General paresis	England	33	1	---
December, 1879	Maniacal exhaustion	Massachusetts	32	1	---
January, 1880	Old age	France	58	1	---
January, 1880	General paresis	Germany	56	1	---
January, 1880	Acute pneumonitis	Canada	23	1	---
January, 1880	Paralysis	United States	34	1	---
January, 1880	Consumption	California	40	---	1
January, 1880	Consumption	China	45	1	---
January, 1880	Chronic gastritis	Massachusetts	54	---	1
January, 1880	Organic disease of brain	Missouri	60	1	---
January, 1880	Tuberculosis	Germany	30	1	---
January, 1880	Cerebral effusion	Germany	36	1	---
January, 1880	Chronic interstitial pneumonia	Massachusetts	59	1	---
January, 1880	Paralysis	New York	35	1	---
February, 1880	Consumption	California	41	---	1
February, 1880	Cerebral effusion	France	43	1	---
February, 1880	Apoplexy	Ireland	65	1	---
February, 1880	Exhaustion	New York	32	---	1
February, 1880	General paresis	France	40	1	---
February, 1880	Epilepsy	England	39	---	1
March, 1880	Epilepsy	Pennsylvania	28	---	1

TABLE VIII—Continued.

Month.	CAUSE OF DEATH.	Nativity.	Age.	Males	Females
March, 1880	Organic disease of brain	Illinois	30	1	---
March, 1880	Exhaustion	Ireland	50	1	---
April, 1880	Organic disease of brain	Germany	50	1	---
April, 1880	Paralysis	Ireland	40	1	---
April, 1880	Pneumonia	Massachusetts	20	1	---
April, 1880	Typhoid pneumonia	United States	30	1	---
April, 1880	General paresis	Germany	45	---	1
April, 1880	Erysipelas	Sandwich Islands	50	1	---
April, 1880	General paresis	Italy	45	1	---
April, 1880	Epilepsy	Massachusetts	21	1	---
April, 1880	Congestion of the lungs	New York	69	---	1
May, 1880	General debility	Ireland	46	---	1
May, 1880	Organic disease of brain	Virginia	42	1	---
May, 1880	Organic disease of brain	Ireland	48	1	---
May, 1880	General paresis	Illinois	58	1	---
May, 1880	Paralysis	France	52	1	---
May, 1880	Organic disease of brain	Missouri	43	1	---
May, 1880	Cerebral hemorrhage	China	20	1	---
June, 1880	Paralysis	New Jersey	36	1	---
June, 1880	General paresis	Rhode Island	39	1	---
June, 1880	Organic disease of brain	New Brunswick	31	1	---
June, 1880	General paresis	Louisiana	38	1	---
June, 1880	Consumption	Illinois	48	1	---
June, 1880	Paralysis	Ohio	54	1	---
June, 1880	Maniacal exhaustion	Germany	38	1	---
June, 1880	Heart disease	Sweden	51	1	---
June, 1880	Organic disease of brain	Russia	52	---	1
June, 1880	General paresis	Ireland	40	1	---
June, 1880	Epilepsy	Massachusetts	23	---	1

TABLE IX.

*Recapitulation of the cause of death of ninety-one patients from July 1, 1879, to July 1, 1880.*

CAUSE OF DEATH.	Males.	Females.	Totals.
Apoplexy	4	---	4
Cerebral effusion	2	---	2
Consumption	6	2	8
Epilepsy	1	3	4
Exhaustion	3	2	5
General debility	---	2	2
General paresis	10	1	11
Inanition	---	1	1
Maniacal exhaustion	3	2	5
Old age	2	---	2
Organic disease of brain	10	1	11
Paralysis	14	---	14
All other causes	19	3	22
Totals	74	17	91



TABLE X.

*Showing the articles made in the sewing-room from July 1, 1879, to July 1, 1880.*

ARTICLES.	Number.
Aprons .....	345
Bath towels .....	68
Bed straps .....	1
Bed ticks .....	86
Bibs .....	86
Boys' jackets .....	6
Brown sheets .....	972
Carpets .....	3
Carpet mats .....	74
Check jackets .....	73
Chemises .....	124
Damask table-cloths .....	5
Drawers .....	236
Dresses .....	316
Duck jackets .....	13
Duck pants .....	12
Duck quilts .....	28
Flannel shirts .....	102
Flannel skirts .....	185
Linen table-cloths .....	50
Napkins .....	84
Night gowns .....	80
Pillow slips (checked) .....	321
Pillow slips (white) .....	550
Pillow ticks .....	208
Roller towels .....	175
Sacques .....	51
Shirts (checked) .....	5
Skirts .....	55
Sun bonnets .....	97
Suspenders .....	52
Waists .....	24
White sheets .....	136

## STEWARD'S REPORT—TABLE FIRST.

*Account of articles purchased and consumed, and other expenses, for the fiscal year ending June 30, 1880.*

ARTICLES.	Value.
Flour	\$7,692 17
Meat	9,635 87
Sugar	3,071 40
Tea	696 81
Syrup	1,618 73
Potatoes	1,317 97
Butter	4,939 42
Coffee	1,477 89
Lard	68 12
Fish	450 23
Poultry and eggs	1,231 87
Beans and peas	530 87
Rice and cracked wheat	475 50
Corn meal and oat meal	394 83
Fruit	492 23
Vegetables	43 45
Salt	75 76
Vinegar	95 48
Small groceries	633 27
Soap and potash	723 74
Drugs	1,265 20
Liquor and ale	794 85
Tobacco	1,166 42
Drygoods	3,164 66
Clothing and hats	3,368 24
Shoes and leather	1,499 86
Blankets	2,032 82
Furniture and crockery	2,076 27
Hardware and tinware	1,677 57
Spoons and cutlery	133 57
Exchange on coin	137 15
Hay and straw	510 53
Grain and feed	423 42
Garden seeds and tools	73 31
Hair and feathers	313 70
Lumber	510 59
Building materials and repairs	1,231 07
Brooms and brushes	460 97
Books and stationery	532 94
Gas	1,374 06
Paints, oil, and glass	577 48
Fuel	12,990 19
Bedding	1,073 15
Miscellaneous	864 21
Discharged patients	835 60
Returned escapes	449 30
Payroll	53,627 38
Horses and cows	440 00
Wagon, cart, and harness	255 00
Carpeting	381 94
Music	9 00
Ice	85 67
Trees and vines	175 60
Gravel	20 00
Sewer pipe	222 50
Gas retort	125 00
Services and mileage of Trustees	661 52
Total	\$131,206 35

TABLE SECOND.

*Showing the cost of the different departments for the fiscal year, ending June 30, 1880.*

DEPARTMENTS.	Cost.
Kitchen and dining-rooms.....	\$27,139 94
Wards.....	11,303 88
Bakery.....	7,890 17
Laundry.....	391 40
Engine room.....	119 74
Farm, dairy, garden, and stable.....	1,862 96
Gas.....	1,374 06
Building materials and repairs.....	2,435 29
Miscellaneous.....	607 33
Drug store.....	1,475 49
Furnishing.....	5,739 12
Center building.....	806 02
Office.....	514 17
Discharged patients.....	835 35
Returned escapes.....	449 55
Fuel.....	12,990 19
Exchange on coin.....	137 15
Services and mileage of Trustees.....	661 52
Laundry building.....	45 38
Grounds.....	800 26
Payroll.....	53,627 38
Total.....	\$131,206 35

TABLE THIRD.

*Averages for the fiscal year ending June 30, 1880.*

MONTHS.	Average Number of Patients daily.....	Average Daily Expenses.....	Average Cost per Capita per Day.....	Average Cost per Capita per Month.....
July, 1879.....	718	\$282 58	\$0 39	\$12 09
August, 1879.....	736	284 49	39	12 09
September, 1879.....	744	298 81	40	12 00
October, 1879.....	765	307 73	40	12 40
November, 1879.....	793	346 18	44	13 20
December, 1879.....	806	381 11	47	14 57
January, 1880.....	806	377 96	47	14 57
February, 1880.....	812	380 88	47	13 63
March, 1880.....	824	363 66	44	13 64
April, 1880.....	837	375 21	45	13 50
May, 1880.....	832	334 75	40	12 40
June, 1880.....	836	342 42	41	12 30
Yearly averages.....	792 $\frac{5}{12}$	\$339 64 $\frac{10}{12}$	\$0 42 $\frac{3}{4}$	\$13 03 $\frac{1}{4}$

TABLE FOURTH.

*Disbursements for the fiscal year ending June 30, 1880.*

FOR WHAT PURPOSE.	Amount.
Maintenance .....	\$124,226 97
Furnishing .....	5,739 12
Grounds .....	800 26
Horses purchased .....	350 00
Cows purchased .....	90 00
Total .....	\$131,206 35

TABLE FIFTH.

*Products of the farm, garden, and dairy, for the fiscal year ending June 30, 1880.*

ARTICLES.	Amounts.
Cabbage, pounds .....	71,579
Carrots, pounds .....	6,763
Beets, pounds .....	26,924
Onions, pounds .....	11,882
Lettuce, pounds .....	2,789
Green peas, pounds .....	422
String beans, pounds .....	545
Turnips, pounds .....	18,291
Radishes, pounds .....	502
Squashes, pounds .....	2,259
Tomatoes, boxes .....	137
Cucumbers, dozen .....	681
Red peppers, pounds .....	848
Parsley, pounds .....	581
Parsnips, pounds .....	2,123
Celery, pounds .....	542
Cauliflower, pounds .....	2,375
Green corn, dozen .....	61
Eggs, dozen .....	1,634
Chickens, dozen .....	33
Milk, gallons .....	11,684
Hay, tons .....	100
Calves, number sold .....	19
Pork, pounds sold .....	7,555

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REPORT OF THE DIRECTORS

AND THE

TWENTY-EIGHTH ANNUAL REPORT

OF THE

Superintendent of the Insane Asylum of the State of California,

AT

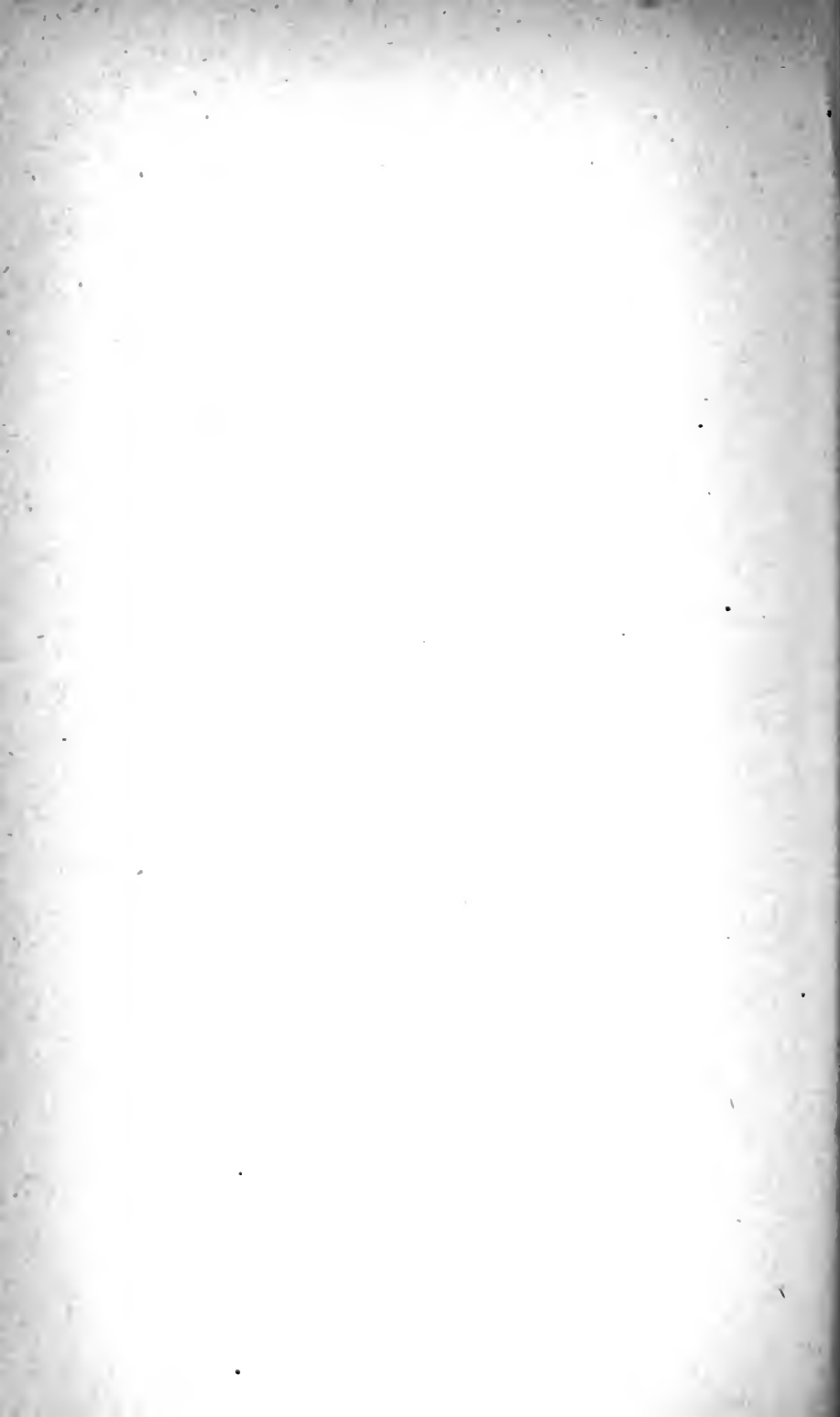
STOCKTON.

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1880.

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## OFFICERS OF THE ASYLUM.

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### DIRECTORS:

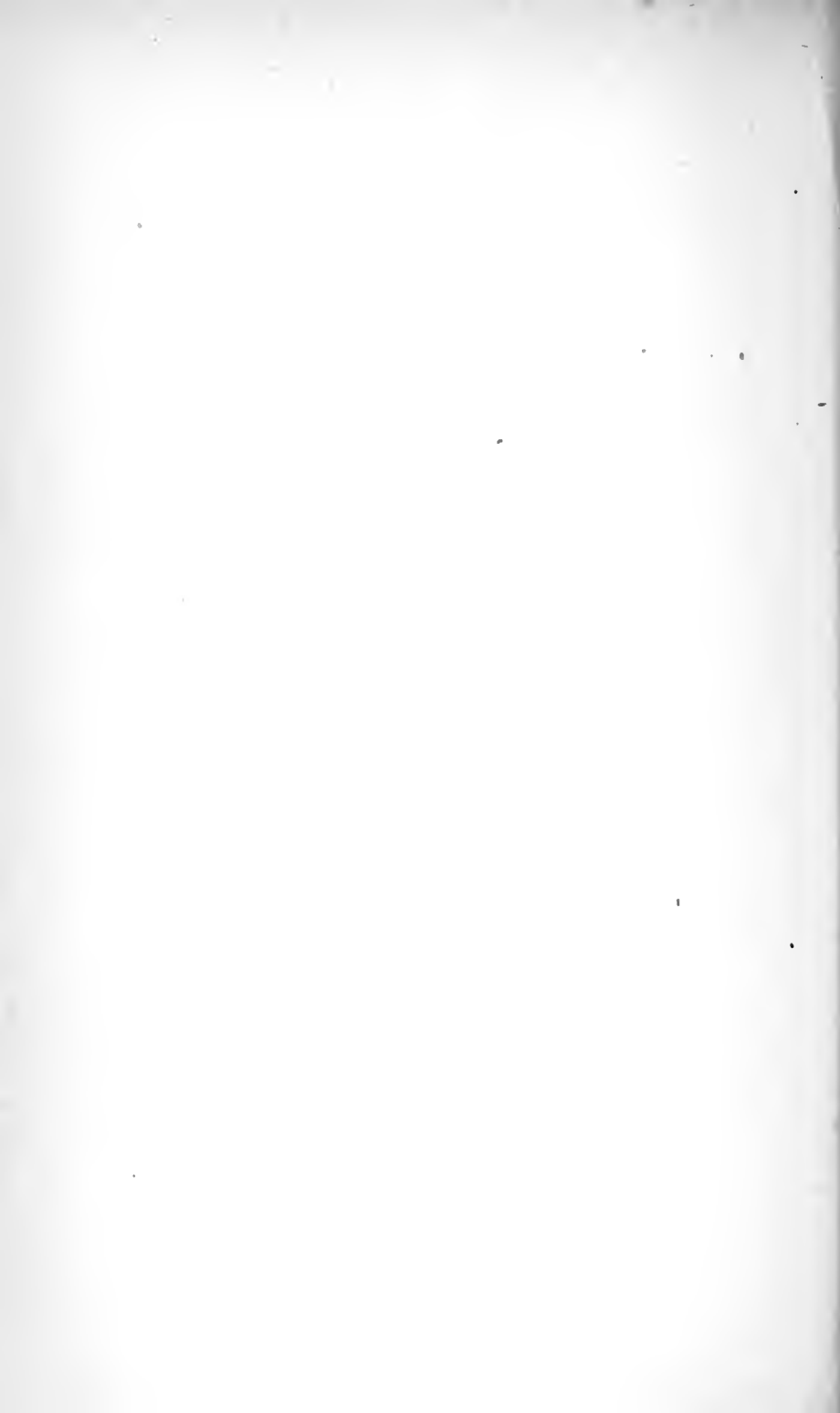
HON. ROBERT WATT, PRESIDENT ..... San Rafael.  
J. K. DOAK, Esq., VICE PRESIDENT ..... Stockton.  
FRANK STEWART, Esq. .... Stockton.  
OBED HARVEY, M. D. .... Galt.  
DONALD McLENNAN, Esq. .... San Francisco.

### TREASURER:

WILLIAM B. AUSTIN ..... Stockton.

### RESIDENT OFFICERS:

G. A. SHURTLEFF, M. D. .... Medical Superintendent.  
W. T. BROWNE, M. D. .... Assistant Physician.  
W. R. LANGDON, M. D. .... Assistant Physician.





# DIRECTORS' REPORT.

INSANE ASYLUM OF CALIFORNIA, }  
 STOCKTON, September 10th, 1880. }

*To his Excellency George C. Perkins, Governor of the State of California:*

SIR: In compliance with law we, the Directors of the State Asylum for the Insane at Stockton, hereby submit our report for the year ending with June thirtieth, eighteen hundred and eighty.

Accompanying this report, and made a part thereof, is the Treasurer's report for the same period, which contains a financial statement of the affairs of the institution.

We also herewith submit the "Twenty-eighth Annual Report" of the Medical Superintendent of said Asylum, which is also made a part of this report, embracing the same period, and containing a more detailed and elaborate account of the general affairs, operations, and condition of the Asylum. It will be observed by the Treasurer's report that there was a—

Balance on hand in the General Fund, July 1st, 1879, of.....	\$ 32,151 90
Received in warrants during the year.....	176,000 00
Received of pay patients during the year.....	5,210 50
Received from sales during the year.....	600 84
<b>Total .....</b>	<b>\$213,963 24</b>
That the amount expended for the general support of the Asylum has been.....	\$175,614 44
Amount paid for freight on coin.....	176 00
Showing a balance in the General Fund, July 1st, 1880, of.....	38,172 80
<b>Total .....</b>	<b>\$213,963 24</b>

No drafts have been made yet upon the funds created by the appropriations of the last Legislature for building and other improvements. The graveling and grading provided for have been commenced, and the work is now in satisfactory progress, but the bills will come into the thirty-second fiscal year.

The preliminary steps for the erection of the new building for which an appropriation of eighty-five thousand dollars was made by the last Legislature, have been taken under the authority of "An Act to regulate contracts on behalf of the State," in relation to the erection of buildings, approved March twenty-third, eighteen hundred and seventy-six. As the money to meet this expenditure must come from taxes levied for the support of the government, etc., for the thirty-second fiscal year, and as the taxes for such purposes are not yet paid to any considerable extent, we have deemed it more prudent and economical to make this work, and the dues on account thereof, correspond in time somewhat to the period when the money

will come into the treasury to pay for the same. We, however, take this occasion to assure your Excellency, on the basis of the progress already made towards the erection of the new structure, as well as in pursuance of a single original purpose, that no foundation for a building shall be laid which, with its superstructure, will not be completed, furnished, and prepared for use in all its appointments, at a cost to the State within the sums appropriated therefor.

Respectfully submitted,

ROBERT WATT,  
J. K. DOAK,  
FRANK STEWART,  
O. HARVEY,  
DONALD McLENNAN,  
Directors.

# TREASURER'S REPORT.

OFFICE OF THE TREASURER OF THE  
INSANE ASYLUM OF CALIFORNIA,  
Stockton, July 1st, 1880. }

*To the Board of Directors of the Insane Asylum of California:*

GENTLEMEN: In accordance with the by-laws of the institution, I have the honor to present the following annual report of the receipts and disbursements of all moneys, from all sources, commencing July the first, eighteen hundred and seventy-nine, and ending June the thirtieth, eighteen hundred and eighty.

## GENERAL FUND.

### *Receipts.*

July 1, 1879, balance as per last biennial report-----	\$32,151 90
August 11, 1879, Warrant No. 86-----	16,000 00
September 15, 1879, Warrant No. 183-----	16,000 00
October 14, 1879, Warrant No. 783-----	16,000 00
November 13, 1879, Warrant No. 1,132-----	16,000 00
December 13, 1879, Warrant No. 1,642-----	16,000 00
January 13, 1880, Warrant No. 2,117-----	16,000 00
February 12, 1880, Warrant No. 3,308-----	16,000 00
March 17, 1880, Warrant No. 3,309-----	16,000 00
April 12, 1880, Warrant No. 4,856-----	16,000 00
May 13, 1880, Warrant No. 6,741-----	16,000 00
June 12, 1880, Warrant No. 7,751-----	5,210 50
June 30, 1880, amount received from pay patients for board and clothing-----	600 84
June 30, 1880, amount received from Steward's sales-----	
	\$213,963 24

### *Disbursements.*

June 30, 1880, amount paid for general support, as per vouchers now on file----	\$175,614 44
June 30, 1880, amount paid for freight on coin-----	176 00
June 30, 1880, balance in General Fund-----	38,172 80
	\$213,963 24

All of which is respectfully submitted.

Your obedient servant,

W. B. AUSTIN, Treasurer.

# SUPERINTENDENT'S REPORT.

*To the Directors of the Stockton State Insane Asylum:*

GENTLEMEN: In compliance with the law governing the management of "The Insane Asylum of the State of California," I hereby submit my Annual Report, as its Medical Superintendent, for the year ending with June 30th, 1880.

The following table presents, in the usual form, the movement of patients during the year:

## ANNUAL SUMMARY.

FROM JUNE 30TH, 1879, TO JULY 1ST, 1880.	Males.	Females.	Totals.
Number of patients, July 1st, 1879 -----	806	321	1,127
Number admitted during the year ending June 30th, 1880----	84	30	114
Number under care and treatment -----	890	351	1,241
Number discharged, recovered -----	30	10	40
Number discharged, improved -----	4	4	8
Number discharged, unimproved -----	1	-----	1
Number died -----	62	10	72
Number escaped -----	3	1	4
Discharged, died, and escaped -----	100	25	125
Number of patients remaining, July 1st, 1880 -----	790	326	1,116

It is shown above that the year commenced with 1,127 patients; that 114 were admitted during the year; that 40 recovered and were discharged; that 8 were discharged improved, and 1 unimproved; that 72 died, and 4 successfully escaped, making the whole number leaving the Asylum 125; and thus reducing the number of inmates from 1,127 to 1,116—a reduction of 11 patients.

The ratio of deaths is lower than it has been for nineteen years, it being 5.80 on the number treated. This is a gratifying result. The ratio of the recoveries to the admissions during the past year is 35 per cent. The very large proportion of chronic and incurable cases in the Asylum, and even of those admitted during the year, makes it impossible to show a large ratio of recoveries as a steady and uniform result.

The number discharged unrecovered in this Asylum is always small, it being last year 9. Very few patients, though they become harmless and inoffensive, are removed by relatives, for the reason that a large proportion of them are without homes or known kindred.

I am sorry to have to think that patients are, apparently without a justifiable reason therefor, sometimes sent directly from County Infirmaries to the State Asylums; or, cases are sent to the Asylum which, it seems to me, more properly belong to the County Hospitals. Helpless, and hence harmless, from senile decay or chronic physical

disease, such are subjects for local care. At any rate, they are not the lawful beneficiaries of the State Asylum for the Insane. The law points plainly to this class in the interdiction that "no case of idiocy or imbecility, or simple feebleness of mind, \* \* \* must be maintained at the Asylum." It is utterly impracticable to carry out this prohibition unless it be observed by the committing magistrates.

There have been fewer successful elopements during the past year than ever before, in the history of the Asylum, since the records were made to show these occurrences—a period of twenty years.

There has been but one suicide during the year, and no other casualty of a serious character. It may, therefore, be said that the efforts of another annual period have been crowned with successful results.

The following table of general statistics exhibits the number of admissions, recoveries, discharges, deaths, whole number treated annually, and in the aggregate; also, the ratio of recoveries and deaths each year, and for the whole time, embracing a period of twenty-nine years, nearly—1851-1880.

## GENERAL STATISTICS.

## NUMBER OF ADMISSIONS, RECOVERIES, DEATHS, ETC.

YEARS.	Admissions	Recoveries	Discharged incurable	Deaths	Escaped	Number resident at the close of each year	Increase	Decrease	Whole number treated	Per cent. of recoveries to admissions	Per cent. of Deaths on the number treated
1851	13	6		1		6	6		13	46.15	7.69
1852	124	50	6	10		62	56		130	40.32	7.69
1853	160	108	8	12		103	41		222	67.50	5.40
1854	202	150	13	21		134	31		305	74.00	6.89
1855	214	168	16	18		162	28		348	78.50	5.20
1856	210	126	15	23		172	10		382	60.00	6.02
1857	206	81	17	28		188	16		378	39.32	7.33
1858	244	112	20	32		273	85		432	45.90	7.41
1859	276	112	22	49		370	97		549	40.58	8.91
1860	248	123	21	54	10	417	47		618	49.59	8.73
1861	198	154	34	33	14	416		1	615	77.77	5.36
1862	301	127	14	65	12	499	83		717	42.19	9.06
1863	252	105	17	47	12	583	84		751	41.67	6.26
1864	219	101	25	82	12	581		2	802	46.12	10.22
1865	268	93	15	82	27	632	51		849	34.70	9.66
1866	279	131	13	62	12	693	61		911	46.95	6.81
1867	313	125	14	89	9	769	76		1,006	40.00	8.80
1868	387	146	13	134	10	853	84		1,156	37.73	11.59
1869	482	225	16	159	15	920	67		1,335	46.68	11.91
1870	562	221	36	156	22	1,047	127		1,482	39.32	10.55
1871	523	245	36	176	23	1,090	43		1,570	46.84	11.21
1872	506	240	33	188	12	1,123	33		1,596	47.43	11.78
1873	401	185	19	152	12	1,156	33		1,524	46.13	9.97
1874	524	209	46	178	23	1,224	68		1,680	39.88	10.59
1875	615	259	71	181	26	1,302	78		1,839	41.95	9.84
1876	414	252	60	172	18	1,214		88	1,716	61.26	10.03
1877	201	83	30	100	7	1,195		19	1,415	41.29	7.06
1878	219	80	19	106	7	1,202	7		1,414	36.53	7.49
1879	106	58	16	100	7	1,127		75	1,308	54.71	7.64
1880	114	40	9	72	4	1,116		11	1,241	35.08	5.80
Totals	8,781	4,115	674	2,582	294		1,312	196			

Thus it is seen that 8,781 patients have been received into the Asylum; of whom 4,115 have recovered and been discharged; 674 have been sufficiently improved to be restored to liberty; 2,582 have died, and 294 have eloped. Of the latter, of course, most have been returned under new commitments.

The ratio of recoveries is a fraction less than 47 per cent. on the whole number admitted.

During the past year, some long required and most substantial and valuable improvements have been made. The old, unsightly wooden buildings—one used as a dormitory for patients, called the “White House,” another for a stable, and another for a hennery—standing directly in the thoroughfare formed by the continuation of Grant Street through the Asylum grounds, have been removed and demolished. The above named thoroughfare has been graded and graveled as far as needed in communicating with, and transferring supplies to, the female department of the institution. The whole amount of graveled done during the year—from July to November, eighteen hundred and seventy nine—is equivalent to about four thousand linear feet of street or roadway. One thousand six hundred twenty-three and a half (1,623½) tons were used, at a cost of two thousand four hundred and thirty-six dollars and seventy-five cents. The gravel is of the best quality for roads or gravel walks. Further improvements of this kind will be prosecuted in the corresponding season of eighteen hundred and eighty; particularly in grading and graveled the airing courts for the use of the patients, and the foot-walks about the grounds.

A new and commodious stable has been built, which was accepted and occupied the eleventh of October, eighteen hundred and seventy nine. It was built, by contract, by Mr. Leonard Furry, of this city, in a faithful and entirely satisfactory manner, for the sum of two thousand three hundred and fifty dollars. The contract was awarded to Mr. Furry at two thousand one hundred and seventy five dollars, the lowest bid. Subsequently it was decided to make the foundation of brick, at an additional cost of one hundred dollars. The roof was painted at a cost of thirty dollars; and some trifling fittings not provided for in the original specifications make the small difference observed between the original bid and the actual cost. The architect was Charles Beasley, Esq., of Stockton, who designed and drew acceptable plans, and superintended the construction of the building attentively and faithfully for the moderate sum of sixty-five dollars and twenty-five cents, which amount is not included in the cost as above stated, and makes the actual cost two thousand four hundred and fifteen dollars and twenty-five cents.

The erection of a new building, provided for by the appropriation of the last Legislature, having as yet not progressed beyond the preliminary stage of the undertaking, is still under your immediate control, and not the subject of any detailed report from me. It, however, should be borne in mind that this new structure is not designed to add to the nominal capacity of the institution. It is to take the place of the long since condemned wards known as the second ward and the “lower tenth.” What the new building can properly accommodate more than are now contained in these two wards will be transferred thereto, as originally proposed, from the number who have temporary or movable beds nightly spread for them on the floors of

the corridors of other wards. It is for the improvement, rather than for the enlargement of the institution.

It is a source of great gratification and encouragement that I am able to report that for five years past there has been a gradual amelioration of the condition of the inmates of this Asylum. Objectionable features are being removed, and the more suitable apartments are being relieved and improved, and brought nearer and nearer a desired standard of accommodation. But, while the occupation of the projected new structure will supersede and discontinue the use of the most repulsive existing features of the Asylum, I must still hopefully look forward to a yet needed extension of brick, to take the place of a present unsafe wooden building. It might seem unreasonable to recommend an appropriation for this to the next Legislature, and I refrain from so doing. The care of the insane is a burden so heavy that it seems almost an unsolved problem if it can be borne, under the present system, without reasonable complaint. It is apparently a perpetual struggle between the idea of economy and the sentiment of humanity. It is my purpose to look fairly upon both sides; and, in doing this, I should be remiss in an acknowledged duty were I to fail to call attention to a want so manifest as that above alluded to.

The following pages furnish a full statistical account of the operations of the Asylum, in tabular form, with explanatory headings to each table:

TABLE A.

*Showing the counties from which one hundred and fourteen patients were admitted, from July 1, 1879, to July 1, 1880.*

COUNTIES.	Males.	Females.	Totals.
Alameda .....	1	1	2
Alpine .....	1	—	1
Amador .....	4	2	6
Calaveras .....	5	—	5
Contra Costa .....	1	2	3
Fresno .....	3	—	3
Humboldt .....	1	—	1
Kern .....	3	—	3
Mariposa .....	1	—	1
Merced .....	3	1	4
Sacramento .....	3	3	6
San Bernardino .....	1	2	3
San Diego .....	1	—	1
San Francisco .....	1	5	6
San Joaquin .....	25	11	36
Santa Clara .....	1	—	1
Santa Cruz .....	—	1	1
Shasta .....	1	1	2
Sierra .....	2	—	2
Stanislaus .....	5	—	5
Tulare .....	5	—	5
Tuolumne .....	5	—	5
Yuba .....	11	1	12
Totals .....	84	30	114

TABLE B.

Showing the nativity of one hundred and fourteen patients, admitted from July 1, 1879, to July 1, 1880.

NATIVITY.	Males.	Females	Totals.
<i>United States.</i>			
Arkansas .....	1		1
California .....	6	2	8
Georgia .....		1	1
Illinois .....	4	1	5
Indiana .....	1	1	2
Iowa .....	1		1
Kentucky .....	2		2
Maine .....		2	2
Massachusetts .....	1		1
Minnesota .....	2		2
Missouri .....	3	4	7
New Hampshire .....	1	1	2
New York .....	5	2	7
Ohio .....	5		5
Oregon .....	1		1
Pennsylvania .....	2		2
Tennessee .....	1	1	2
Vermont .....	2	1	3
Virginia .....	3		3
Wisconsin .....	1		1
Totals .....	42	16	58
<i>Foreign Countries.</i>			
Austria .....	1		1
Canada .....	4	2	6
China .....	4	1	5
England .....	2	1	3
France .....	4		4
Germany .....	5	3	8
Greece .....	1		1
Ireland .....	10	6	16
Italy .....	4		4
Mexico .....	2	1	3
Otaheite .....	1		1
Scotland .....	3		3
Switzerland .....	1		1
Totals .....	42	14	56

## RECAPITULATION.

NATIVITY.	Males.	Females.	Totals.
United States .....	42	16	58
Foreign countries .....	42	14	56
Totals .....	84	30	114



TABLE C.

*Showing the ages at which insanity first appeared in one hundred and fourteen patients, admitted from July 1, 1879, to July 1, 1886.*

AGES.	Males.	Females.	Totals.
Less than 10 years.....	1	-----	1
Between 10 and 15 years.....	2	-----	2
Between 15 and 20 years.....	8	3	11
Between 20 and 25 years.....	4	3	7
Between 25 and 30 years.....	20	4	24
Between 30 and 35 years.....	6	7	13
Between 35 and 40 years.....	10	5	15
Between 40 and 45 years.....	13	2	15
Between 45 and 50 years.....	6	2	8
Between 50 and 55 years.....	6	2	8
Between 55 and 60 years.....	4	1	5
Between 60 and 65 years.....	2	1	3
Between 65 and 70 years.....	2	-----	2
Totals.....	84	30	114

TABLE D.

*Showing the ages of one hundred and fourteen patients at the time of their admission from July 1, 1879, to July 1, 1880.*

AGES.	Males.	Females.	Totals.
Between 10 and 15 years.....	2	-----	2
Between 15 and 20 years.....	6	2	8
Between 20 and 25 years.....	3	3	6
Between 25 and 30 years.....	18	2	20
Between 30 and 35 years.....	8	3	11
Between 35 and 40 years.....	11	6	17
Between 40 and 45 years.....	9	2	11
Between 45 and 50 years.....	10	3	13
Between 50 and 55 years.....	8	4	12
Between 55 and 60 years.....	4	3	7
Between 60 and 65 years.....	3	1	4
Between 65 and 70 years.....	2	1	3
Totals.....	84	30	114

TABLE E.

*Showing the supposed cause of insanity, as stated in commitments, of one hundred and fourteen patients, from July 1, 1879, to July 1, 1880.*

SUPPOSED CAUSES.	Males.	Females.	Totals.
Masturbation .....	12	—	12
Intemperance .....	7	1	8
Business troubles .....	6	—	6
Hereditary predisposition .....	4	2	6
Epilepsy .....	4	1	5
Epilepsy, brought on by fighting fire .....	1	—	1
Epilepsy, brought on by injury to head .....	1	—	1
Injury to head .....	4	—	4
Domestic troubles .....	1	3	4
Dissipation, irregular habits, etc. ....	2	—	2
Syphilis .....	2	—	2
Over study .....	—	2	2
Spiritualisin .....	1	1	2
Religious excitement .....	1	1	2
Inflammation of brain .....	1	—	1
Chronic irritation of brain .....	—	1	1
Sunstroke .....	1	—	1
Long-continued illness .....	—	1	1
Meningitis chronica .....	1	—	1
Softening of the brain .....	—	1	1
Senility .....	1	—	1
Change of life .....	—	1	1
Cerebral hyperæmia (chronic) .....	1	—	1
Child-bearing and fall when young .....	—	1	1
Disappointment in love matters .....	1	—	1
Murder of father .....	—	1	1
Exposure to weather .....	1	—	1
Puerperal .....	—	1	1
Lonely life and self-abuse .....	1	—	1
Unknown .....	30	12	42
Totals .....	84	30	114

TABLE F.

*Showing the class of insanity of one hundred and fourteen patients, at the time of their admission, from July 1, 1879, to July 1, 1880.*

FORM OF DISEASE.	Males.	Females.	Totals.
Mania .....	38	13	51
Monomania .....	16	6	22
Melancholia .....	8	4	12
Dementia .....	22	7	29
Totals .....	84	30	114

TABLE G.

*Showing the civil condition of one hundred and fourteen patients, at the time of their admission, from July 1, 1879, to July 1, 1880.*

CIVIL CONDITION.	Males.	Females.	Totals.
Married .....	17	17	34
Single .....	65	8	73
Widows .....		5	5
Widowers .....	2		2
Totals .....	84	30	114

TABLE H.

*Showing the occupation of one hundred and fourteen patients, admitted from July 1, 1879, to July 1, 1880.*

OCCUPATIONS.	Males.	Females.	Totals.
Laborers .....	28		28
Housewives .....		17	17
Farmers .....	12		12
Miners .....	12		12
House servants .....		3	3
Bookkeepers .....	2		2
Sheepherders .....	2		2
Teachers .....		2	2
Housekeepers .....		2	2
Washerwomen .....		2	2
Blacksmith .....	1		1
Policeman .....	1		1
Saloonkeeper .....	1		1
Musician .....	1		1
Steward .....	1		1
Bank accountant .....	1		1
Mechanic .....	1		1
Lawyer .....	1		1
Salesman .....	1		1
Tanner and farmer .....	1		1
Stockraiser .....	1		1
Confectioner .....	1		1
Carriage painter .....	1		1
Carriage trimmer .....	1		1
Gardener .....	1		1
Woodchopper .....	1		1
Cook in sheep camp .....	1		1
Carpenter .....	1		1
Machinist .....	1		1
Glovesmaker .....	1		1
Barber .....	1		1
Cabinetmaker .....	1		1
Teamster .....	1		1
School girl .....		1	1
None .....	5	3	8
Totals .....	84	30	114

TABLE I.

*Showing the cause of death of seventy-two patients during the year, from July 1, 1879, to July 1, 1880.*

Month.	CAUSE OF DEATH.	Nativity.	Age.	Males	Females
July, 1879.....	Consumption.....	Tennessee.....	47	1	---
July, 1879.....	Epilepsy.....	Unknown.....	Unknown.	1	---
July, 1879.....	Consumption.....	Ireland.....	54	1	---
July, 1879.....	Consumption.....	Ireland.....	32	1	---
July, 1879.....	Paralysis.....	Ireland.....	48	1	---
July, 1879.....	Marasmus.....	Ireland.....	51	---	1
July, 1879.....	Disease of liver.....	Denmark.....	55	1	---
August, 1879.....	Dysentery.....	Germany.....	28	1	---
August, 1879.....	Epilepsy.....	New York.....	32	1	---
August, 1879.....	Paralysis.....	France.....	64	1	---
September, 1879.....	Consumption.....	Scotland.....	47	1	---
September, 1879.....	Decay of old age.....	Massachusetts.....	74	---	1
September, 1879.....	Diarrhea.....	China.....	58	1	---
September, 1879.....	Consumption.....	Italy.....	35	1	---
September, 1879.....	Erysipelas.....	Ireland.....	39	1	---
September, 1879.....	Syphilitic disease of brain.....	Tennessee.....	35	1	---
October, 1879.....	General paresis.....	New York.....	46	1	---
October, 1879.....	Paralysis.....	Ireland.....	71	---	1
October, 1879.....	Tabes mesenterica.....	Massachusetts.....	59	---	1
October, 1879.....	Paralysis.....	Ohio.....	51	1	---
October, 1879.....	Anasarca.....	Maryland.....	52	1	---
October, 1879.....	Consumption.....	Louisiana.....	32	1	---
November, 1879.....	Maniacal exhaustion.....	Ireland.....	68	---	1
November, 1879.....	Remittent fever.....	Vermont.....	39	1	---
November, 1879.....	Consumption.....	China.....	46	1	---
November, 1879.....	Heart disease.....	Ireland.....	43	1	---
November, 1879.....	Apoplexy.....	China.....	Unknown.	1	---
November, 1879.....	Paralysis and choking while being fed.....	Virginia.....	54	1	---
December, 1879.....	Fatty heart.....	Prussia.....	41	1	---
December, 1879.....	Epilepsy with cerebral effusion.....	Ohio.....	40	1	---
December, 1879.....	Organic disease of brain.....	Italy.....	51	1	---
December, 1879.....	Consumption.....	Maine.....	64	1	---
December, 1879.....	Consumption.....	Chili.....	52	1	---
January, 1880.....	General paresis.....	Ohio.....	46	1	---
January, 1880.....	Paralysis.....	New York.....	47	---	1
January, 1880.....	Consumption.....	China.....	45	1	---
January, 1880.....	Consumption.....	New Brunswick.....	36	1	---
January, 1880.....	Epilepsy.....	California.....	17	1	---
January, 1880.....	Paralysis.....	England.....	52	1	---
January, 1880.....	Epilepsy.....	Switzerland.....	34	1	---
January, 1880.....	Organic disease of brain.....	New York.....	59	1	---
January, 1880.....	Epilepsy.....	California.....	23	1	---
February, 1880.....	Cerebral disease.....	California.....	17	---	1
February, 1880.....	Pneumonia.....	California.....	19	1	---
February, 1880.....	Scrofulosis.....	California.....	21	1	---
February, 1880.....	Epilepsy, from old injury of head.....	Ireland.....	57	1	---
February, 1880.....	Consumption.....	Germany.....	50	1	---
February, 1880.....	Apoplexy.....	France.....	58	1	---
February, 1880.....	Marasmus.....	Ireland.....	42	1	---
February, 1880.....	Senile decay.....	Switzerland.....	70	1	---
March, 1880.....	Paralysis.....	New York.....	57	1	---
March, 1880.....	Consumption.....	Ireland.....	39	---	1
March, 1880.....	Epilepsy.....	California.....	18	1	---
March, 1880.....	Senile decay with epilepsy.....	Virginia.....	70	1	---
March, 1880.....	Consumption.....	Ireland.....	35	---	1
March, 1880.....	Consumption.....	Switzerland.....	Unknown.	1	---
March, 1880.....	Enteritis.....	Austria.....	53	1	---
March, 1880.....	Erysipelas.....	Canada.....	52	1	---
April, 1880.....	Acute delirious mania.....	Greece.....	69	1	---

TABLE I—Continued.

Month.	CAUSE OF DEATH.	Nativity	Age.	Males	Females
April, 1880	Consumption	Norway	27	1	---
April, 1880	Diarrhea	Mexico	50	1	---
April, 1880	Organic disease of brain	Tennessee	63	1	---
April, 1880	Suicide	Wisconsin	19	1	---
April, 1880	Scrofulosis	France	58	1	---
April, 1880	Tuberculosis	Mexico	49	1	---
April, 1880	Consumption	Mexico	48	1	---
May, 1880	Consumption	Ireland	57	---	1
May, 1880	Paralysis	Mexico	54	1	---
May, 1880	Hepatitis	Scotland	48	1	---
June, 1880	Paralysis	Virginia	50	1	---
June, 1880	Fatty degeneration of heart	Germany	40	1	---
June, 1880	Strangulated scrotal hernia	Delaware	56	1	---

TABLE J.

*Recapitulation of cause of death of seventy-two patients, during the year, from July 1, 1879, to July 1, 1880.*

CAUSE OF DEATH.	Males.	Females.	Totals.
Consumption	15	3	18
Paralysis	8	2	10
Epilepsy	8	---	8
Cerebral disease	3	1	4
Heart disease	3	---	3
Senile decay	2	1	3
General Paresis	2	---	2
Apoplexy	2	---	2
Erysipelas	2	---	2
Disease of liver	2	---	2
Scrofulosis	2	---	2
Diarrhea	2	---	2
Marasmus	1	1	2
All other causes	10	2	12
Totals	62	10	72

TABLE FIRST.

*Showing account of articles consumed and current expenditures in the Asylum, for the year ending with June 30, 1880.*

ARTICLES.	Values.
Flour .....	\$11,095 97
Meat .....	14,660 09
Sugar .....	5,819 58
Tea .....	1,461 34
Syrup .....	916 54
Potatoes .....	2,739 29
Butter .....	5,499 96
Coffee .....	1,940 29
Lard .....	240 84
Fish .....	760 62
Poultry and eggs .....	288 16
Beans and peas .....	557 32
Rice and cracked wheat .....	945 24
Corn meal and middlings .....	397 21
Fruit .....	677 34
Vegetables .....	87 44
Salt .....	158 34
Vinegar .....	128 50
Small groceries .....	1,418 79
Soap and potash .....	1,345 03
Drugs and medicines .....	1,597 79
Liquors .....	899 15
Tobacco .....	1,703 21
Dry goods .....	1,977 06
Clothing and hats .....	8,252 31
Shoes and leather .....	2,352 49
Blankets .....	2,018 74
Furniture and crockery .....	983 75
Grain and feed .....	1,165 70
Hardware and tinware .....	930 93
Garden tools and seeds .....	242 73
Lumber .....	533 20
Building material and repairs .....	1,996 95
Improvements .....	2,716 15
Brooms and brushes .....	520 71
Books and stationery .....	325 93
Gas and oil .....	1,751 85
Paints, oils, and glass .....	535 38
Fuel .....	13,891 67
Bedding .....	2,405 91
Castings, pipes, and iron .....	670 54
Discharged patients .....	112 50
Returned escapes .....	183 50
Pay-roll and wages .....	69,989 52
Miscellaneous .....	1,997 72
Total .....	\$170,893 28

TABLE SECOND.

*Showing the cost of the different departments for the year ending with June 30, 1880.*

DEPARTMENTS.	Cost.
Male kitchen and dining-room.....	\$27,917 48
Male department.....	48,183 82
Female kitchen and dining-room.....	16,639 00
Female department.....	31,724 49
Bakery.....	11,382 95
Laundry and engine-house.....	4,665 47
Farm, garden, and dairy.....	5,334 39
Repairs and improvements.....	5,781 68
Medical Superintendent.....	4,928 98
First Assistant Physician.....	4,300 02
Second Assistant Physician.....	4,300 02
Miscellaneous.....	5,734 98
Total.....	\$170,893 28

TABLE THIRD.

*Averages.*

MONTH.	Average Number of Patients on Hand	Average Daily Expense	Average Cost per Capita per Day (Cents).	Average Cost per Capita per Month.....
July, 1879.....	1,126	\$490 39	43½	\$13 50
August, 1879.....	1,125	473 86	42	13 05
September, 1879.....	1,124	456 94	40½	12 20
October, 1879.....	1,125	524 62	46½	14 45
November, 1879.....	1,121	504 47	45	13 50
December, 1879.....	1,122	472 42	42	13 06
January, 1880.....	1,125	500 29	44½	13 79
February, 1880.....	1,120	449 05	40	11 63
March, 1880.....	1,117	459 04	41	12 74
April, 1880.....	1,116	433 04	39	11 64
May, 1880.....	1,116	434 90	39	12 09
June, 1880.....	1,118	400 58	36	10 75
Yearly average.....	1,121	\$466 92	41½	\$12 70

TABLE FOURTH.

*Products of the farm, garden, and dairy, for the year ending with June 30, 1880.*

ARTICLES.	Amount.
Beets, pounds.....	26,996
Tomatoes, pounds.....	46,775
Turnips and carrots, pounds.....	39,317
Pumpkins and squashes, pounds.....	23,579
Beans and peas, pounds.....	7,715
Other vegetables, pounds.....	1,053
Other vegetables, bunches.....	742
Corn and cucumbers, dozens.....	2,453
Cabbage, pounds.....	14,955
Onions, pounds.....	12,108
Lettuce, cauliflower and celery, dozens.....	779
Peppers and okra, pounds.....	760
Apples, pears, apricots, and plums, pounds.....	20,491
Grapes, pounds.....	22,495
Hay, tons.....	120
Fodder, tons.....	25
Pork, pounds.....	11,314
Milk, gallons.....	6,328
Eggs dozens.....	386
Chickens, number.....	24
Pigs sold, number (\$105 00.).....	44
Calves sold, number (\$7 00.).....	3

I most thankfully acknowledge the receipt of the following newspapers, regularly contributed by their respective proprietors or managers: Stockton Daily Independent, Sacramento Weekly Bee, Sacramento Semi-weekly Record-Union, San Francisco Weekly Bulletin (two copies), San Francisco Weekly Chronicle, San Francisco Weekly Examiner, San Francisco Daily Post, San Francisco Daily Abend Post, Daily Courier de San Francisco, San Francisco Spirit of the Times, San Francisco Occident. No gratuitous favors are so acceptably received by the inmates, or contribute so much to their entertainment and benefit, as do these regular supplies of this kind of reading.

In conclusion, I would express my gratitude for the good degree of success which has marked the operations of this institution during the year; for the preservation of the buildings from the ravages of fire; for the absence of contagious or unusual disease; for the escape from serious accident from ungovernable and irresponsible violence; for liberal appropriations of money for support and improvements; for faithful work performed by every grade of officers and employes, and especially for your own able management and kind support.

G. A. SHURTLEFF,

Medical Superintendent State Asylum for the Insane.  
Stockton, California, August 5th, 1880.



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FIRST ANNUAL REPORT

OF THE

STATE BOARD OF PRISON DIRECTORS

OF THE

STATE OF CALIFORNIA,

FOR THE THIRTY-FIRST FISCAL YEAR, ENDING JUNE 30, 1880,

ALSO,

Supplemental Reports of the Four Subsequent Months, to October 31, 1880.

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## STATE BOARD OF PRISON DIRECTORS.

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AUG. H. CHAPMAN, President.....Chico, Butte Co.  
WM. F. McNUTT, M. D.....San Francisco.  
WALLACE EVERSON.....Oakland.  
GEO. W. SCHELL.....Modesto, Stanislaus Co.  
JACOB H. NEFF.....Colfax, Placer Co.  
JEROME SPAULDING, Secretary.

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## OFFICERS OF THE SAN QUENTIN PRISON.

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J. P. AMES.....WARDEN.  
JOSEPH V. ELLIS.....CLERK.  
L. H. CARY, M. D.....PHYSICIAN.  
REV. HIRAM CUMMINGS.....MORAL INSTRUCTOR.

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## OFFICERS OF THE FOLSOM PRISON.

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THOMAS C. POCKMAN.....WARDEN.  
JOHN M. MINER.....CLERK.  
W. A. GROVER, M. D.....PHYSICIAN.



# REPORT.

OFFICE OF THE STATE BOARD OF PRISON DIRECTORS,  
410 KEARNY STREET, SAN FRANCISCO, November 1, 1880. }

*To his Excellency GEO. C. PERKINS, Governor of the State of California:*

In compliance with the requirements of section five of the Act of the Legislature entitled "An Act to define, regulate, and govern the State Prisons of California," approved April 15, 1880, the undersigned have the honor to transmit herewith their first official report of the condition of the State Prisons, together with a statement of the receipts and expenditures for the thirty-first fiscal year, and the four subsequent months ending October 31, 1880, and such suggestions as the interests of the prisons seem to require.

## CONSTITUTIONAL PROVISIONS.

Article X of the Constitution lately adopted and ratified by the people, among other things provides: "That there shall be a State Board of Prison Directors, to consist of five persons, to be appointed by the Governor, with the advice and consent of the Senate. The Board of Directors shall have the charge and superintendence of the State Prisons, and shall possess such powers and perform such duties in respect to other penal and reformatory institutions of the State as the Legislature may prescribe. The Board shall appoint the Warden and Clerk, and determine the other necessary officers of the prison. The Legislature shall pass such laws as may be necessary to further define and regulate the powers and duties of the Board, Wardens, and Clerks, and to carry into effect the provisions of this Article. After the first day of January, 1882, the labor of convicts shall not be let out by contract to any person, copartnership, company, or corporation, and the Legislature shall by law provide for the working of convicts for the benefit of the State."

## STATUTORY PROVISIONS.

Section twenty-one of said Act to define, regulate, and govern the State Prisons, provides: "That all convicts not employed on contracts may be employed by authority of the Board of Directors, under charge of the Wardens, and such skilled foremen as they may deem necessary, in the performance of work for the State, or in the manufacture of any article or articles which, in the opinion of the Board, may inure to the best interests of the State; and the Board of Directors are hereby authorized to purchase, from time to time, such tools, machinery, and materials, and to direct the employment of such

skilled foremen as may be necessary to carry out the provisions of this section, and to dispose of the articles manufactured and not needed by the State, for cash, at public auction, or otherwise."

Section twenty-five of the same Act provides that, "After the passage of this Act no skilled convict labor shall be let out or contracted out at a price less than one dollar per day for each convict."

#### NEW SYSTEM.

It will be observed that by virtue of the above constitutional and statutory provisions, a radical change has been effected in the government and conduct of the prisons of this State, and especially in the utilization of convict labor for the purposes of revenue to support the prisons.

The plain intent and purpose of the law is to wholly discontinue, by the first of January, 1882, the contract system that has heretofore prevailed in our penal economy, and to compel the working of convicts on State account exclusively; that is to say, the State must become a manufacturer; must superintend the mechanical operations of the shops; invest its own capital; purchase its own material with which to carry on different branches of business, and dispose of the manufactured goods, as well as to suffer all the losses in machinery, stock, and bad debts, and the expenses and perplexities incident to the buying, manufacturing, and selling of goods. As to the wisdom of the system, thus inaugurated by a large majority of the people of the State, in the adoption of the new organic Act, it is not the province of the Board to question or discuss.

Nevertheless we find by investigation, that in nearly all the prisons of the United States, and especially in those which are self-supporting, or nearly so, the contract system prevails, probably because it is generally less expensive to the government than the management of prison labor by the officers of the prison. In fact, in almost every prison where the system of State management has been tried, it has been abandoned, but whether from the inherent defects, or from mismanagement of the system, it is not necessary to determine.

The centralization of the prison control, in a Board of Directors, with long terms of office, was designed to prevent a too frequent change in the management of prison affairs, and to remove the same as far as possible from the evils of mere partisan influences—a step in the right direction. The radical change effected in the industrial interests of the prison, had its origin, no doubt, in the belief that cheap prison labor came in direct and ruinous competition with free mechanical labor of the State. To carry out the will of the taxpayers and the people, as expressed in the Constitution and laws, is the work to which the Board have seriously and earnestly addressed their efforts. And recognizing the spirit and policy of the law, and the obligations it imposes, the Board propose to select such industries as shall, in their judgment, be most profitable to both the State and to the prisoner himself, and at the same time interfere as little as possible with free mechanical labor. At the same time it should be borne in mind that this proposed transition from the old system to the new, cannot be successfully accomplished without immediate and extensive preparations, and a heavy expense to the State. No passive hesitating policy will meet the expectation of the people. Situated as we are, differing somewhat in soil, climate, industrial pursuits, and

resources, from other States, we have no precedent upon which we can wholly or confidently rely. In a large degree, therefore, our undertakings must be experimental. The Board may have made, and probably will make mistakes, but whatever may be the result of their efforts, they hope they may be entitled to the charitable indulgence, if not the support and concurrence of the public.

#### SAN QUENTIN.

The Board of Directors organized on the thirtieth day of January, 1880, by the election of Director Aug. H. Chapman President, and Jerome Spaulding Secretary of the Board. On the same day J. P. Ames was appointed Warden, and on the tenth day of February, J. V. Ellis Clerk of this prison. Both these gentlemen entered upon the discharge of their duties on the first of March, 1880. On assuming charge of the prison, there were confined therein 1,446 prisoners of all ages, kinds, and conditions, and from almost every country. The prison was crowded beyond its proper capacity, hundreds of the inmates were locked up or turned loose in the inclosure during the day for necessary exercise, or left to concoct all kinds of mischief without earning anything for their support. Besides the few who were absolutely required for cooking, washing, repairing clothing, and other necessary work, only 164 were employed in the workshops during the month of March; 198 in April; 318 in May, and 313 in June. These were employed by the day, at fifty cents each, at the pleasure or option of the employers, and discharged at their will or caprice.

Of course this enforced idleness of the larger portion of the convicts, while it entailed heavy expense upon the State for their support, militated against the best interests of health, discipline, and reform in the prison. The important question, therefore, was how to utilize the labor of the convicts, and restore the proper discipline of the prison. Under the energetic and efficient action of the Warden, preparations were at once made for the manufacture of brick, and by the middle of June about 250 prisoners were employed in and about the brickyard. For the amount and value of the brick manufactured to date, reference is hereby made to the Warden's report. The following improvements have been made at the prison, viz.: The grading and macadamizing of the roadway from the steamer landing to the prison grounds. New water pipes were laid down for the better protection of the prison buildings and workshops from fire, the old ones being entirely inadequate for the purpose. At the entrance of the prison grounds a brick wall and a neat and substantial brick guardhouse, two stories high, were erected, and the streets and roads within the grounds have been graded and improved. The old building that for many years had been used for officers' and guards' quarters had become entirely unfit for occupation. Its foundations and floors were decayed and filled with vermin; while in sunshine it was merely a covering, it was no protection in storm. The Board, therefore, on the thirteenth day of May, passed an order for its removal, and for the erection of a new brick building, according to plans and specifications furnished by the Warden. This building is now nearly completed, and ready for occupancy. It contains guards' quarters and bath-room on the second floor, and on the first the officers' kitchen, dining-room, reception rooms, and offices. It is built in a most substantial manner and presents a handsome appearance.

Three new dwelling houses have also been erected, for the use of the Clerk, Resident Physician, and Commissary, which will be rented for a sum equivalent to a fair rate of interest on their cost.

#### ARMAMENT.

A Lowell Battery gun has been purchased and mounted at the post commanding the prison yard and front gate; also, a number of small arms, in place of the old and almost worthless ones heretofore in use. The thorough discipline of the officers and guards, with effective arms, is the best preventive against plots and escapes—a fact very soon recognized by the prisoner himself.

#### GASLIGHT.

One of the first subjects that demanded the attention of the Board was the better lighting of the prison yard and grounds. The light produced by lamps, then in use, being entirely inadequate, as well as unsafe, troublesome, and expensive. Accordingly, on the thirty-first day of May last, the Board, after a careful and thorough investigation of the subject of manufacturing illuminating gas, entered into a written contract with the San Rafael Gas Company, for a supply of coal gas for the prison, for a period of ten years, at the rate of three dollars per 1,000 cubic feet, for the first 50,000 feet, and two dollars and ninety cents per 1,000 cubic feet, for all in excess of that amount consumed during any one month, the gas to be of not less than twenty-candle power. The work was completed on the 9th day of October, and has since been in successful operation. The Board feel no hesitation in asserting that the lighting of the prison by this method is greatly superior to the old, in safety, brilliancy, and economy. This contract is on file in the office of the Warden, and is hereby referred to for full particulars.

#### OTHER IMPROVEMENTS.

Many other necessary improvements of minor importance have been made, such as painting the buildings and prison cells, substituting iron bedsteads for the rough wooden frames heretofore in use, etc. All these improvements were made by convicts, who could not have been otherwise employed, excepting two free mechanics, to oversee the more important portions of the work. These improvements have added largely to the value of the property of the State. For a detailed account of the improvements above mentioned and other expenses, the financial condition of the institution, and other information concerning the condition and discipline of the prison, etc., you are referred to the report of the Warden hereto annexed.

The discipline has been strict, yet mild and effective. The flogging that was regarded necessary in former years has not been resorted to in a single instance; every case of stubbornness has yielded to firm and humane treatment without severity. If a single spark of manhood or honor remained in the prisoner it has been encouraged and developed. Neatness, order, and system prevail in every department.

#### POLICE.

Under the present Warden, the officers and guards are required to dress in uniform, and are drilled and practiced in the use of arms.



## CLAY LANDS.

The clay lands owned by the State, for brick making, having been nearly worked out, pursuant to the provisions of section twelve of the Act of the Legislature, aforesaid, the Board contracted with David Porter for the purchase of fifty acres of clay lands suitable for brick making, lying contiguous to the prison grounds, at the rate of \$300 per acre. This purchase was completed on the fourteenth day of July, 1880, and the deed duly executed and delivered by the grantor. These lands will afford profitable employment to a large number of prisoners, for many years. This purchase has proven a most excellent investment, as you will observe, by referring to the Warden's report, on the subject of the manufacture of brick. For a full description of said clay lands reference is hereby made to the deed on file in the office of the Secretary of State.

## JUTE FACTORY.

Acting upon the suggestion contained in your Excellency's inaugural address, respecting the manufacture of jute bags, the Board, after making an exhaustive examination of the whole subject, determined to establish the enterprise, and for the following reasons, viz.: the enormous demand for these goods, by the farmers of this State; the larger portion of their value being in the labor necessary for their production, it will afford constant and remunerative employment to nearly or quite 500 convicts, many of whom might be physically incapacitated for the hard labor required in other branches of industry, and especially because of its non-competition with free white labor, and of the unqualified indorsement it has received from leading farmers and other business men of the State.

Of the many manufacturing interests, which we have investigated, this seems the most feasible, the most likely to be successful, and the best adapted to the wants of our State.

Accordingly, on the twenty-first day of August last, we entered into a contract with Messrs. Fairbairn, Kennedy & Naylor, of Leeds, England, through their authorized agent, John E. Stevens, for the purchase of 100 looms, and the other necessary machinery required in the manufacture of burlaps, twine, and jute bags, to be shipped from Liverpool on or before the first day of December, 1880. The cost of the machinery laid down in San Francisco, including tariff, freight, and insurance, will be \$96,000, or to cover all contingencies say \$100,000. The Board expect the factory to be in operation about the first of May next; such at least is their earnest desire. That there may be no delay in beginning operations on the completion of the factory, an order was given in October last, to Messrs. Degener & Co., of San Francisco, for two hundred and fifty tons of jute, to be shipped immediately from Calcutta. Another order was also given to Messrs. Balfour, Guthrie & Co., for two hundred and fifty tons, to be shipped at a later date.

In this connection we may remark that to induce the raising of jute we have ordered a quantity of jute seed for distribution among the farmers who may desire to experiment in its cultivation.

Of the many other industries which we have carefully investigated, we find that there are no felt hats, or plain ingrain carpets, manufactured on this coast, and that many of the hats sold here are manu-

factured in Eastern prisons. We hope that in time we will be able to profitably employ all our prisoners in the manufacture of such articles as are not made on this coast by free white labor.

#### CONTRACTS FOR SUPPLIES.

After publication of notice, as required by law, the Board awarded contracts for supplies for the support of the prison to the lowest bidder, for each article, instead of aggregate bids, as was formerly the custom. It is believed that this will avoid an evil in contracting that has been of long standing.

#### RECEIPTS AND EXPENDITURES.

As shown by the Warden's report, the receipts from all sources, of this prison, for the thirty-first fiscal year, were \$202,869 67, and the expenditures for the same period, \$255,387 81, leaving a deficiency of \$52,518 14 still unprovided for by law. We ask an appropriation to liquidate the same at the earliest practicable moment. For the details of the receipts and expenditures, and maintaining cost of the prison, see the Warden's report.

#### SECRETARY'S REPORT.

The report of the Secretary of the Board, hereto appended, shows an additional expenditure, to the end of the fiscal year, of \$570 70 for salary of Secretary, rent, and other necessary expenses of their office in San Francisco.

#### PHYSICIAN'S REPORT.

The Hospital has been thoroughly renovated, and is in good order. The monthly cost of medicines in this department, under the supervision of the Resident Physician, has been reduced to about half the previous cost. For further information concerning this department, and the sanitary condition of the prison, we particularly invite your attention to the Physician's report.

#### MORAL INSTRUCTION.

The report of the Moral Instructor, to which you are hereby respectfully referred for information concerning the moral and educational interests of the prison, is appended to the Warden's report, as a part thereof. This department seems to have been established for teaching the younger criminals, and to place reading material in reach of those who are disposed to read, or have the time and facilities for so doing. For religious observances and moral instruction, it has been the custom to depend entirely upon the kindness of those who are sufficiently interested to volunteer their services. As yet, we have made no change in the duties of the Moral Instructor, but we hope soon to give this department the attention it deserves, and place it on a footing at least equal to that which it occupies in the prisons of other States. The devotion and self-sacrifice of those who have so long and faithfully administered to the spiritual wants of these unfortunate creatures, are worthy of all praise.

## OVERCROWDED STATE OF THE PRISONS.

Between the twenty-sixth day of July and the thirtieth day of September, 1880, 200 prisoners were transferred from this to the Folsom Prison, and yet there are still 1,309 convicts remaining in this prison, crowded into 703 cells, seven of which are large rooms, into which are crowded nearly 200 prisoners. This doubling up or congregating of prisoners we regard as one of the great evils of our system; it renders classification simply impossible. It necessarily brings the younger and less criminal class in daily contact and association with the vilest and most depraved elements of criminal life, thereby destroying more effectually any good qualities that may remain, without in the slightest degree redeeming the utterly vicious.

Lieutenant-Governor Johnson, the late Warden, in his last report, says:

Each prisoner must have a separate cell, and the law must authorize his confinement therein, for a time at least, with or without work, when he first enters, or at any time, for that matter, at the discretion of the management. As soon as the Folsom Prison is opened, which may be at any time after the first of January next, a trifling outlay of money will prepare the necessary room to place each prisoner in a cell by himself. When we have accomplished so much, and inaugurated the new system, which we may do by transferring 500 prisoners to the new penitentiary at Folsom, ours may rank among the highest and best institutions for the suppression of crime and the reformation of criminals.

As to the result of this indiscriminate association of criminals at San Quentin, Warden Johnson remarks:

This sort of association here is doubtless the cause of hundreds of returns to the prison, and of course of the commission of hundreds of crimes.

This vice, for such it is, in our penal system, may doubtless be greatly diminished, if not altogether remedied, by a classification of prisoners, based, as we believe, on the age, education, state of mind and former life of the convict, and the character of the crime committed. To that end an enlargement of the prison yard, and the erection of suitable buildings therein, would be indispensably necessary. Should our views upon this subject be approved by your Excellency and the Legislature, soon to be convened, we ask an appropriation sufficient for that purpose. From a letter addressed to the President of the Board of Prison Inspectors of Pennsylvania, in the year 1877, by the Rev. J. B. Bittinger, D. D., who was a distinguished member of the several National Prison Congresses held in the United States, and of the International Congress held in London in the year 1872, we quote the following as especially applicable to the subject under discussion:

Out of this method of congregating prisoners arises the necessity and means of their classification. It is by comparison that prison officers learn who are the good workers, the good scholars, and the good prisoners. All are criminals, *but all convicts are not equally criminal*. The law recognizes this in its definition of crimes—their kinds and degrees. The Courts recognize it in their different sentences, as to time and severity. Now, shall the officers of our penal institutions go one step further, and put convicts who differ into different classes? Shall they recognize that to be a fact which the Legislature, the judiciary, and the common sense of the people recognize; nay, which the prisoner himself recognizes? Shall we act on it? Shall we carry justice into all the departments of punishment, and into all the details of reform?

We must classify to be just. We ought to classify to meet the prisoners' sense of justice. We have penitentiaries; we have common jails; we have workhouses, and reformatories. These all recognize degrees of guilt, and degrees of hope of reformation.

Now, what shall be the steps out of the penitentiary into society? How many, and how large? The penitentiary is the lowest criminal depth; few get there *per saltum*. Can they

get out by one jump? I think the steps should be gradual, tentative, preparatory; such as have been tested by experience, and such as can be judged by observation.

We must begin by recognizing merit. This is solid ground. Our commutation law rests on this. On this basis pardons are bestowed, pay for overwork is recognized, and a bounty given to the released prisoner.

#### FOLSOM PRISON.

For the condition of this prison and the amount and character of the work done towards the completion of the prison buildings, you are respectfully referred to the interesting report of T. C. Pockman, Superintendent of construction from March 1st to July 15th, 1880—now the Warden—which is hereto annexed and made a part of this report.

Of the \$40,000 appropriated by the Legislature of 1880, to be used in completing the prison, \$24,964 34 have been expended at this date, leaving the sum of \$15,036 66 still on hand. Nearly all of the convicts received at this prison have been constantly employed upon the buildings, or in making other necessary improvements appertaining thereto, by which means the Board have been enabled to save to the State many thousands of dollars, which otherwise would have been unavoidably expended in the completion of the prison.

The principal industry to be carried on at this prison, it is well understood, is that of quarrying and cutting granite from the quarry near the prison. To carry on this business with safety and economy, will require a wall on at least two sides of the quarry, of the estimated cost of at least \$15,000, besides the convict labor that may be employed in its construction. On assuming charge of this prison there was found a deficiency in the appropriation made by the Legislature for the years 1877-8 for the construction of this prison of \$9,000. This sum is now due to contractors for work done under the former administration. An appropriation for the payment of the same should be made at the earliest practicable moment.

#### RECOMMENDATIONS FOR PARDON, ETC.

Section thirty-four of the Act of April 15th, 1880, requires the Board of Directors to report to the Governor, from time to time, the names of any and all persons confined in the State Prison who, in their judgment, ought to be pardoned out and set at liberty on account of good conduct, or unusual term of sentences, or any other cause, which in their opinion should entitle such prisoners to pardon. While it may not, perhaps, be reasonably claimed that this provision trenches upon the constitutional prerogative of the Executive to grant pardons and commutations of sentences after conviction for offenses, it imposes an onerous duty upon the Board of Directors. The Board have examined a considerable number of applications, and given them such attention as a very limited time for investigation would permit. A few have been recommended for pardon or commutation, and the reasons therefor stated.

In our opinion there are numerous cases of unusual terms and inequality of sentence, as well as of good conduct, that in justice to the prisoners, and a proper regard for humanity, ought to be examined, but to do this in the manner its importance demands would require much more time than the Board can possibly afford to give, without any compensation, or even reimbursement for expenses necessarily incurred.

Reference is made to the duties imposed by this section, that it may receive the attention its importance demands.

In conclusion, we would respectfully call your attention to the accompanying reports of the Wardens and other officers of the several departments of the prisons, for more detailed information, adding our general approval of the manner in which their respective departments have been managed during this most trying and difficult period of our prison history, and expressing to them our thanks for their uniform patience with, and humane consideration for the prisoners, and constant faithfulness to duty.

Respectfully submitted.

AUG. H. CHAPMAN,  
WALLACE EVERSON,  
W. F. McNUTT, M. D.,  
J. H. NEFF,  
GEO. W. SCHELL,  
Directors.

JEROME SPAULDING, Secretary.

## SECRETARY'S REPORT.

OFFICE OF THE STATE BOARD OF PRISON DIRECTORS, }  
410 Kearny Street, San Francisco, ———, 1880. }

*To the honorable Board of State Prison Directors of California:*

GENTLEMEN: I have the honor to report, that since assuming the office of Secretary of your Board, there have been recorded in the General Record Book of the prisons, kept at this office, the proceedings of thirty-nine business meetings, of which twenty-one were held in San Francisco, nine at San Quentin, five at Sacramento, and four at Folsom.

A communication has been addressed to the several State Prisons of the United States, soliciting such information as might afford a knowledge of their respective systems of prison management, to the end that your honorable Board, in its desire to perfect a more satisfactory system for the prisons under its direction, might have at its command the written experience of similar Boards, that for many years have been engaged in a like undertaking.

Annual and biennial reports, documentary and other useful information, have been kindly forwarded by the Wardens and other officers of most of the prisons throughout the United States; which favors have been duly acknowledged, and so far as possible reciprocated by this office.

The expenditures of this office, to the close of the thirty-first fiscal year, June 30, 1880, are as follows:

Furniture .....	\$187 40
Rent of office .....	50 00
Salary of Secretary .....	300 00
Other expenses .....	33 33
Total .....	\$570 73

Respectfully submitted.

JEROME SPAULDING, Secretary.

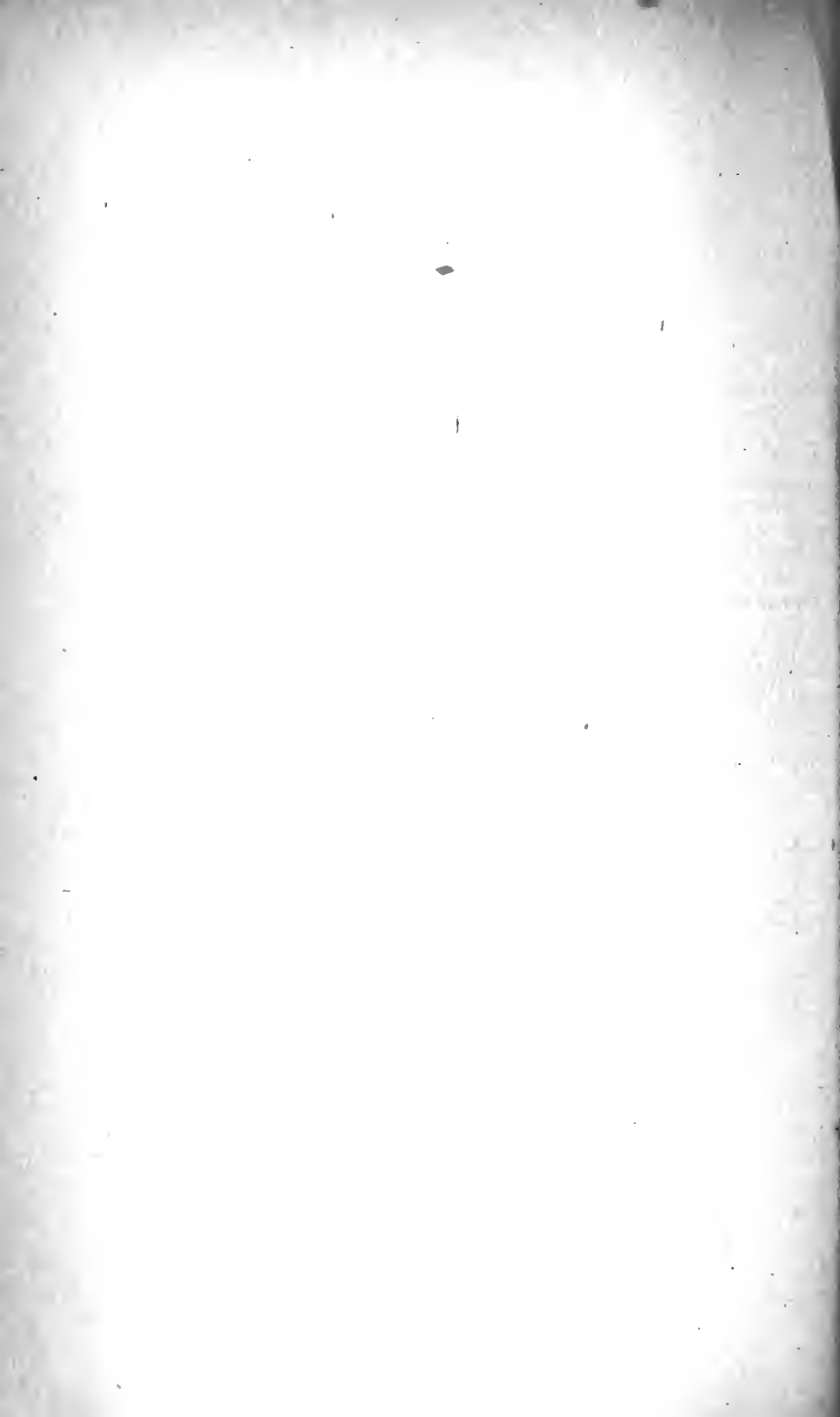
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Report of Warden of the California State Prison.

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# WARDEN'S REPORT.

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OFFICE OF THE WARDEN, CALIFORNIA STATE PRISON, }  
SAN QUENTIN, November 1, 1880. }

*To the honorable Board of State Prison Directors:*

GENTLEMEN: I herewith respectfully submit this, my first report, as Warden of the State Prison at San Quentin, with the accompanying reports of the officers attached hereto.

The statistical tables of all the reports have for three quarters of the year been compiled from the records of the last administration, and I believe are correct.

Deeming it not inappropriate on this occasion to make a few remarks in reference to prison management, I beg leave to state, in brief, my views in regard to discipline, reform, and the vexed question of prison labor, and since, under the new Constitution, the contract system of labor expires in 1882, I would also make a few suggestions concerning the introduction of trades under a State administration.

The ultimate object of penal institutions being the suppression of crime, it follows that every legitimate means should be employed toward the accomplishment of that end.

The criminal should not only be restrained of his liberty, but he should be subjected to a discipline so thorough as to prevent his again committing crimes, and every effort should be made to reclaim the criminal through reformatory influences.

Equal in importance with the self-sustaining theory of prison management is that of prison reform. It is altogether desirable that our prisons should be made self-supporting, but the question should not be considered wholly from a financial standpoint. The reformatory aspect should not be overlooked in that of the economic one.

Labor is indispensable as a means of reform, but the labor should be productive, and not merely penal, unproductive labor, which affords no mental exercise, and simply serves to degrade the convict.

There is a class whose aversion to work is so great that, rather than labor, they will resort to unlawful means to obtain the necessities of life. There is no cure for this class but enforced labor, and after being compelled to labor for a term of years, such prisoners may acquire the habit of work.

As a very small per cent. of the inmates of our State Prisons and penitentiaries have ever acquired any knowledge of trades, the thought very naturally suggests itself, that were trades more generally taught, there would be a very perceptible falling off in our criminal records; and I feel convinced of the necessity of having every pris-

oner taught some trade by which he may be enabled to obtain a livelihood after his discharge. The aptitude of the prisoner should be taken into consideration, and he should be assigned to whatever kind of labor he seems by nature best fitted—not forgetting that one of our main objects is to make the institution self-supporting.

The greater the number of trades introduced the less materially will any one branch suffer from competition. The labor should be of a kind that will compete as little as possible with free labor, but it should be some industry for which there is demand, or the convict, after his release, will find himself as incapable of making a living as he was before his imprisonment; and no one will deny that many of the poorer and uneducated classes find it difficult to obtain the means wherewith to sustain life. The prisoner should receive encouragement, and should be made to feel that, although he has transgressed against the laws of society, there is yet hope for him in the future. Notwithstanding the very worst elements of society are here represented, there are many who are not by any means beyond redemption. Some who are here for the first time, and upon the lighter charges, fully realize the dreadful situation to which their crimes have brought them—and these especially should be made to feel that their lives are not wholly blighted, and that by living in an upright and useful manner, they may in time regain the respect and confidence of their fellow men.

It is my opinion that every prisoner when he first enters should be kept in solitary confinement for awhile—the time varying from a few weeks to that of a few months, according to the mental and physical condition of the prisoner, his age, and the magnitude of his crime, but in very few instances would I advise complete isolation for any great length of time, as it has been shown, upon the most reliable authority, that solitary confinement for a long period does certainly impair the mental powers and lead to imbecility or insanity. To confine the prisoner in his cell for a short time and debar him from all social intercourse, I think, has a decidedly salutary effect; it gives him an opportunity to reflect upon his past career, and if he is not wholly depraved, has a tendency to make him penitent, and form better resolves for the future; it also exercises a wholesome influence over him, by making him more amenable to discipline and the restraints of prison life. As it is at night time when the prisoners are gathered together in their cells that schemes of mischief are concocted, plans of escape devised, and all the vices incident to prison life engaged in, I feel convinced of having every prisoner confined in a separate cell at night, but during the day I would allow such reasonable intercourse as would not interfere with proper discipline.

I think the evidence abundant and conclusive that a too rigorous discipline, and the resorting to any barbarous policy, will in no instance reform the criminal, but will invariably have the opposite tendency.

Spencer, in his admirable article on Prison Ethics, says:

That the most equitable system is the one best calculated to reform the offender, may indeed be deductively shown. The internal experience of every one must prove to him that excessive punishment begets not penitence but indignation and hatred.

So long as an aggressor suffers nothing beyond the evils that have naturally resulted from his conduct—so long as he perceives that his fellow men have done no more than was needful for self-defense—he has no excuse for anger, and is led to contemplate his crime and his punishment as cause and effect. But if gratuitous sufferings are inflicted on him, a sense of injustice

is produced. He regards himself as an injured man. He cherishes animosity against all who have brought this harsh treatment on him.

Glad of any plea for forgetting the injury he has done to others, he dwells, instead, on the injury others have done to him. Thus maturing a desire for revenge rather than atonement, he reenters society not better but worse, and if he does not commit further crimes, as he often does, he is restrained by the lowest of motives—fear.

As a further illustration of the force of my argument, I take the liberty of citing an example quoted by Spencer in the article just referred to. It is that of the Munich State Prison at the time when M. Obermair was appointed Governor. It is stated that :

He found from six hundred to seven hundred prisoners in the jail, in the worst state of insubordination, and whose excesses he was told defied the harshest and most stringent discipline. The prisoners were all chained together, and attached to each chain was an iron weight which the strongest found difficulty in dragging along. The guard consisted of about one hundred soldiers, who did duty not only at the gates and around the walls, but also in the passages, and even in the workshops and dormitories, and strangest of all protections against the possibility of an outbreak or individual invasion, twenty to thirty large savage dogs of the bloodhound breed were let loose at night in the passages and courts to keep their watch and ward. According to his account the place was a perfect pandemonium, comprising, within the limits of a few acres, the worst passions, the most slavish vices, and the most heartless tyranny.

This harsh system was gradually lightened, the dogs were dispensed with, and nearly all the guards, and the prisoners were treated in such a manner as to gain their confidence; and again, when in a few years the prison was visited, "the gates were wide open, without any sentinel at the door, and a guard of only twenty men idling away their time in a guard-room off the entrance hall. None of the doors were provided with bolts and bars; the only security was ordinary locks, and as in most of the rooms the key was not turned, there was no obstacle to the men walking into the passage. Over each workshop some of the prisoners with the best characters were appointed overseers, and if a prisoner transgressed a regulation his companions generally told him '*est ist verboten*,' (it is forbidden), and it rarely happened that he did not yield to the opinion of his fellow prisoners. Within the walls every description of work was carried on. The prisoners were distributed into different gangs, and supplied with instruments and tools, made their own clothes, repaired their own prison walls, forged their own chains, produced various specimens of manufacture which were turned to most excellent account; the result being that each prisoner by occupation and industry maintained himself, the surplus of his earnings being given him on his emancipation, avoiding his being parted with in a state of destitution." Now let us look at his result:

During his six years government of the Kaiser-lauten, (the first prison under his care), M. Obermair discharged 132 criminals, of which number 123 have conducted themselves well, and 7 have been recommitted. From the Munich prison, between 1843 and 1845, 298 prisoners were discharged. Of that number, 246 have been restored, improved, to society. Those whose characters are doubtful, but have not been remanded for any criminal act, 26; again under examination, 4; punished by the police, 6; remanded, 8; died, 8.

While I should consider it decidedly objectionable to allow the extent of liberty as cited in this case, I merely state the example as proving that of the two extremes of undue severity on the one hand, and extreme leniency on the other, the latter course has been more efficacious in reforming the criminal. I do not wish to be understood to advocate unrestrained social intercourse among the convicts. I strongly advocate the almost complete isolation of the more youth-

ful prisoners from the older ones. But among these younger prisoners I would allow more freedom of intercourse than among the adults. I would separate, as far as practicable, the better class of convicts from those who are more depraved, and upon these latter I would place greater restrictions. To carry out successfully the idea of reform, there should be at this place another yard or inclosure, in which should be erected a Reformatory for all the boys and young men, and for that class of prisoners who, by their deportment, show penitence for their crimes, and give encouragement to the hope that they may be reclaimed to society. Viewed from a reformatory standpoint, this separate yard is an absolute necessity. As the prison is now constructed, it is almost impossible to protect the boys from the contaminating influences that necessarily exist in all penitentiaries. I use the term "boys" in this connection, as there are confined here many who, in consequence of their youth, should be under the care of some benevolent institution, instead of the State Prison. There is another reason why there should be a separate yard. In case of fire, we would have here one thousand three hundred or one thousand four hundred prisoners in one inclosure, whom it would be impossible to control, but if there were another yard, those in one could be removed to the other. This arrangement would not only give a better opportunity to save the property to the State, but would also prevent the escape of perhaps a large number of convicts. The cost of such a structure, yard, and reformatory, would not exceed \$25,000.

Even to the casual observer this is a matter that claims the serious and prompt consideration of your honorable Board, and would, if properly directed, restore in many instances a great number of youths imprisoned, who, with the association that one inclosure almost compels, are apt to become as indifferent to the value of moral obligation or principle as the criminal whose business is crime.

The following is a descriptive list of such buildings as have been erected, with other improvements made: First, a guard post or tower at the eastern or main approach to the prison, of brick, two stories high, and an octagon in form. Running at a right angle from this building a massive wall of brick was built across the main thoroughfare, sixty-six feet, with main gates in the center. Total cost, \$480. Next, at the front or eastern wall to the left of the main gate, a building one hundred and twelve and a half feet long, thirty-three feet wide, thirty-five feet high, was erected for quarters for officers and guards. It is of brick, two stories, with tin roof; the lower story being arranged for reception room, offices, dining hall and kitchen for the officers and guards; the second story being used for sleeping apartments and guard room. The ground floor is paved with Portland cement, and a sidewalk of the same material extends along the entire front, twelve feet in width. Each apartment is lighted with gas, the second story being supplied with bathrooms. This building particularly, has a thorough finish, both as to brick and carpenter work, and apart from being commodious and ample, is an improvement that adds largely to the appearance of the prison. Its total cost is \$4,699 65.

The three two-story frame cottages for officers, with parlor, dining room, four sleeping rooms, and kitchen, each having been finished in a most substantial and tasteful manner, cost \$1,341 45 each.

The guard's kitchen, of brick, with tin roof, floor of Portland cement, fifty feet long, by nineteen feet wide, cost \$287 40.

The gas meter building, of brick, with tin roof, two stories, twenty-six feet long by fourteen feet wide, cost \$165.

The washhouse, of brick, replacing old rickety buildings, twenty-four feet long by twelve feet wide, cost \$73.

The brick warehouse, on the west beach, at the brickyard, seventy-seven feet long by twenty-seven feet wide (not quite completed), cost, to October 31st, \$143. This furnishes ample space for housing and storing goods to and from the prison, a necessity long ago acknowledged.

The brick cottage, single story, thirty-four feet long by thirty feet wide (not yet completed), cost, to October 31st, \$382 90.

The returning wall, five and a half feet high, running west one hundred and sixty feet from the new guard post already mentioned, to protect the grade in front of cottages, cost \$75.

The six and eight-inch water pipe, with plugs, hose, bibbs, etc., within the yard of the prison, to supply a deficiency in the water mains from the reservoir, and to establish three large fire plugs in the upper yard, for use in case of fire, cost \$1,100.

The main thoroughfare from the prison to the point, or wharf, has been reduced to an easy grade, with broad roadway, since May last, by prison labor, although, for the most part, through the property of individuals, and the dirt taken out has been utilized in the brickyard.

The gas mains have been laid from the connection with the pipe of the San Rafael Gas Company to all the most important points within the prison walls. The light is so far superior to the old system of oil and naphtha as to admit of a reduction of the expense of the night guard force to at least \$100 per month. From the intensity and brilliancy of the lights, as distributed through the yards, the opportunities for properly guarding each prison building and the other property of the State, will be increased, while the risks against accidents by fire will be materially lessened, and the impossibility of escape, on the part of prisoners, be rendered almost complete. This improvement has, to October 31st, cost \$2,256 08. From about three acres of the brick land purchased, five kilns have been burned, aggregating about 3,000,000 bricks, two thirds of which are excellent quality.

Apart from about 500,000 brick used in State improvements at the prison since May, there remains a sufficient stock on hand to realize a profit sufficient to pay at least two thirds of the cost of the whole fifty acres of land purchased, and allow a liberal use besides for further improvements that may be necessary within the present fiscal year.

For a detailed financial statement, I refer to the tables furnished by the Clerk:

No. 1.—An abstract of entire receipts and expenditures.

No. 2.—An exhibit of the cost of maintaining prisoners.

No. 3.—An exhibit of the cost of maintaining prisoners for the four months ending October 31st, 1880, as a comparison.

An examination of these tables will show a deficiency from the previous administration of \$52,518 14, an amount required to cover the cost of maintenance and general improvements for the months of April, May, and June, 1880.

As no extraordinary expenditures were made during the fiscal year for improvements or new buildings, the deficit is due to the insufficiency of the general appropriation.

For salary to officers and guards as shown by the last administration for July, August, and September, 1879, the amounts considerably exceed those given in Table No. 1. To explain this it is proper to state that the matter of profit has been ignored heretofore in making up the tables for maintenance. For instance, in July, 1879, the actual amount of salary was \$5,130 65, but of that amount so much was reserved for merchandise, washing, shoes, medicines, tinware, wood, and other material, and labor, as to admit of a profit to the State as the difference shown by Table No. 1, and the total amount \$5,130 65. This profit is embraced in the receipts from sale of merchandise, etc., and the amounts were utilized by being added to the moneys received from the State for the general support of the prison.

I may cite as another instance that in the matter of the total expense of \$65 29 for washing in July, 1879, towards the maintaining cost, the past administration committed the error of giving no credit for \$54 11 collected against that expense from miscellaneous washing from employes, etc. To be more explicit, \$65 29 should not have been charged as a part of the maintaining cost, when \$54 11 was returned in the cash collections. The balance was the actual expense. Such errors refer to other accounts, as will be seen by comparison, and to get at the actual maintaining cost I have given each account such credits as properly belong to them from the cash collections, and have thereby reduced the average cost for supporting the prisoners to a correct figure. I have included in the accounts of general expense such items as are charged to general use, expense account, and freight and telegrams, reducing the number of ledger accounts in this instance as in others, to allow at any time a complete examination of the books without the tedious process attendant upon a large number of minor accounts.

In addition to the more important improvements which have been made so far without special necessity for appropriation beyond the general fund, various improvements have been completed in the way of painting the cells and prison buildings, and roofing with asphaltum several of the older and leaky larger buildings within and without the prison.

The tabular statements of the Turnkey, following in proper succession, are explanatory and complete, as are also those furnished by the prison Physician and Surgeon and by the Moral Instructor.

In the conclusion of my report I am free to state that every attention has been carefully given by the officers and guards in their various duties towards a discipline firm and effective, without being harsh. To them I award the deserved assurance of doing all in their power towards aiding me in rendering our system of prison government thorough and harmonious.

To your honorable Board I render my report, in the hope that my most careful and faithful attention to the charge committed to my trust may meet with your approval.

Very respectfully yours,

J. P. AMES,  
Warden.

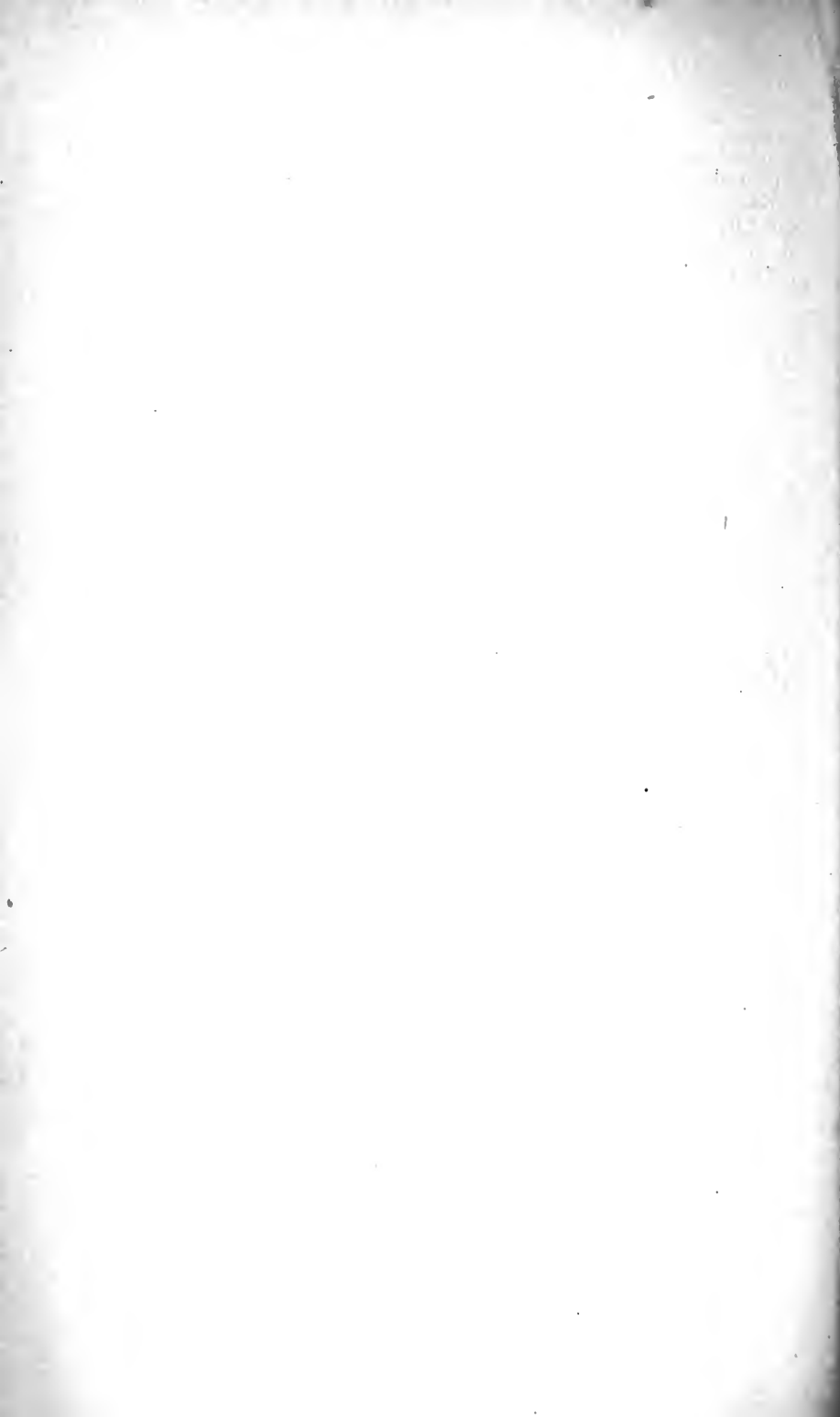
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# Report of the Clerk of the California State Prison.

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## CLERK'S REPORT.

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*To the Hon. J. P. Ames, Warden California State Prison, San Quentin:*

DEAR SIR: I have the honor to submit to you herewith, my report in tabular statements for the fiscal year ending June 30th, 1880, with a comparative statement additional, embracing the first four months of the present fiscal year—all referring to the receipts and disbursements for the general support of the prison, with the cost for the maintenance of the prisoners for the same period.

Very respectfully yours,

J. V. ELLIS,  
Clerk.



## STATEMENT I.—Continued.

Months.	EXPENDITURES.				No. of Convicts on Contract Work -----	Average No. of Convicts-----
	Salary.	Maintenance of Prisoners.	Prison Improvements.	New Buildings.		
July, 1879 -----	\$4,251 18	\$10,928 00	\$6,251 08	-----	\$21,430 26	201
August, 1879 -----	4,265 10	10,547 35	7,065 65	-----	21,878 10	266
September, 1879 -----	4,287 90	9,995 26	8,830 64	-----	23,073 80	327
October, 1879 -----	4,196 72	10,344 73	8,097 53	-----	22,638 98	336
November, 1879 -----	-----	11,193 98	5,115 63	-----	16,309 61	348
December, 1879 -----	8,188 28	11,537 10	6,563 86	-----	26,289 24	1,529
January, 1880 -----	3,020 25	11,590 29	4,375 32	-----	18,985 86	207
February, 1880 -----	5,182 10	11,271 90	1,175 61	-----	17,629 61	201
March, 1880 -----	4,152 58	11,553 53	2,720 88	-----	18,426 99	164
April, 1880 -----	4,130 04	10,815 05	5,193 50	\$141 90	20,280 49	198
May, 1880 -----	4,068 11	10,622 99	4,605 63	783 20	20,079 93	318
June, 1880 -----	4,154 39	10,937 07	10,566 47	2,706 91	28,364 84	313
Totals -----	\$49,896 65	\$131,297 25	\$70,561 80	\$3,652 01	\$255,387 81	265
Deficit amount due for merchandise and other purchases for the month of June -----						\$18,518 14
Deficit amounts borrowed and disbursed in May and June, by J. P. Ames, Warden, by order of the Board of Directors, to meet the indebtedness of April and May, 1880, and a part of that of March, 1880 -----						34,000 00
Total deficit-----						\$52,518 14

## STATEMENT II.

*Exhibit of the Cost of Maintaining Prisoners at the California State Prison, San Quentin, for the fiscal year ending June 30, 1880.*

Months.	Subsistence.	Salary.	Water.	Clothing.	Shoes.	Bedding.	Fuel.
July, 1879-----	\$6,161 92	\$4,251 18	\$1,000 00	\$736 08	\$405 87	\$208 37	\$839 28
August, 1879-----	5,962 48	4,265 10	1,000 00	1,007 30	474 39	209 60	340 05
September, 1879-----	5,790 75	4,287 90	1,000 00	829 36	426 59	252 98	191 38
October, 1879-----	5,807 99	4,196 72	1,000 00	836 70	382 17	370 84	193 19
November, 1879-----	6,114 33	4,071 20	1,000 00	1,144 27	493 49	442 21	221 30
December, 1879-----	6,291 65	4,117 08	1,000 00	1,025 86	391 42	526 35	403 09
January, 1880-----	6,582 61	4,040 30	1,000 00	798 59	542 08	243 61	660 60
February, 1880-----	6,254 62	4,162 05	1,000 00	812 50	416 28	257 94	618 92
March, 1880-----	6,212 02	4,152 58	1,000 00	820 03	503 22	408 87	821 39
April, 1880-----	5,742 63	4,130 04	1,000 00	1,039 87	573 26	296 25	561 86
May, 1880-----	5,748 24	4,068 11	1,000 00	1,207 74	628 54	460 93	246 94
June, 1880-----	5,698 20	4,154 39	1,000 00	1,210 94	454 75	600 24	236 98
Totals-----	\$72,367 44	\$49,896 65	\$12,000 00	\$11,469 24	\$5,692 06	\$4,278 19	\$5,334 98

STATEMENT II—Continued.

MONTHS.	Forage.	General Ex- pense.	Drugs and Medi- cines.	Stationery.	Washing.	Total Cost per Month.	Average Number of Prisoners.	Average Cost per Capita per Day-----
July, 1879-----	\$289 69	\$982 95	\$256 72	\$35 94	\$11 18	\$15,179 18	1,553	31.6
August, 1879-----	197 61	1,074 29	241 57	32 55	7 51	14,812 45	1,558	30.7
September, 1879-----	221 82	917 78	260 12	54 04	10 44	14,243 16	1,531	31.1
October, 1879-----	219 54	1,155 76	276 55	92 83	9 16	14,541 45	1,530	30.7
November, 1879-----	211 20	1,225 34	298 12	31 50	11 22	15,265 18	1,524	33.4
December, 1879-----	249 28	1,344 67	238 18	37 41	9 19	15,654 18	1,529	34.0
January, 1880-----	343 97	1,033 25	314 70	56 68	14 20	15,630 59	1,484	34.0
February, 1880-----	251 79	1,372 24	252 60	21 21	13 80	15,433 95	1,446	36.9
March, 1880-----	182 73	1,282 28	261 74	51 06	10 19	15,706 11	1,439	35.2
April, 1880-----	121 19	1,117 99	262 94	88 51	10 55	14,945 09	1,427	33.9
May, 1880-----	31 83	1,070 65	137 75	83 32	7 05	14,691 10	1,471	32.2
June, 1880-----	147 85	1,419 32	93 20	74 19	1 40	15,091 46	1,515	33.2
Totals-----	\$2,468 50	\$13,996 52	\$2,914 19	\$659 24	\$115 89	\$181,193 90	1,500	33.1

## STATEMENT III.

*Exhibit of the Cost of Maintaining Prisoners at the California State Prison, San Quentin, for the Four Months ending October 31, 1880.*

Months.	Subsistence.	Salary.	Water.	Clothing.	Shoes.	Bedding.	Fuel.
July, 1880-----	\$5,660 35	\$4,226 38	\$1,000 00	\$1,326 19	\$616 57	\$460 39	\$285 09
August, 1880-----	5,520 62	4,243 30	1,000 00	1,023 61	427 44	187 04	216 70
September, 1880-----	5,279 27	4,506 64	1,000 00	694 12	274 80	259 88	* 168 25
October, 1880-----	4,912 67	4,507 34	1,000 00	784 03	335 31	31 71	196 60
Totals-----	\$21,372 91	\$17,083 66	\$4,000 00	\$3,827 95	\$1,654 12	\$939 02	\$1,202 14

\* Engine fuel.

## STATEMENT III—Continued.

Months.	Forage.	General Ex- pense.	Drugs and Medi- cines.	Stationery.	Postage.	Total Cost per Month.	Average Number of Prisoners.	Average Cost per Capita per Day-----
July, 1880-----	\$202 82	\$656 24	\$137 29	\$91 48	\$12 95	\$14,675 75	1,520	31.2
August, 1880-----	266 51	657 19	126 02	29 64	† 13 31	13,754 06	1,506	30.
September, 1880-----	213 72	460 27	95 55	79 46	12 68	13,043 36	1,410	31.
October, 1880-----	238 30	490 79	64 82	13 61	14 80	12,515 34	1,319	30.
Totals-----	\$921 35	\$2,264 49	\$423 68	\$214 19	\$67 35	\$53,988 51	1,439	30.3

† Laundry.

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# TURNKEY'S REPORT.

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TABLE I.—TURNKEY'S REPORT.

*Recapitulation of Received and Discharged Prisoners, from July 1, 1879, to July 1, 1880.*

MONTHS.	Number of Prisoners on Hand at the Close of each Month.													
1879.	July	28	1	29	18	13							3	40
	August	52	1	54	25	13			1				4	49
	September	29		33	35	15			1				3	60
	October	45		51	32	12	1		1				1	52
	November	45		45	21	17	1	3					2	51
	December	62		64	31	16		1	2				3	59
1880.	January	7		7	26	18		1					1	52
	February	14		15	27	19	1	2					2	53
	March	22		23	21	5		1					1	30
	April	39		39	30	15			2				4	51
	May	93		100	32	10	6	4					1	56
	June	95		95	26	19	1	1	3				1	51
Totals		531	12	555	324	172	14	14	1	20	19	2	28	604
Total Discharged														604
Escaped														7
Discharged by Order of United States Commissioners														1
Sent to Insane Asylum														2
Died														3
Pardoned by the President														1
Pardoned by the Governor														1
Discharged by Commutation														3
Discharged by Order of Court														4
Taken out by Order of Court for New Trial														2
Taken out by Order of Court as Witnesses														1
Discharged per Act														13
Discharged per Act, and Restored														13
Total Receipts														29
United States Prisoners														1
Returned from Insane Asylum														1
Returned without being Granted a New Trial														2
Escapes Recaptured														1
Returned Convict Witnesses														2
Received by Commitment														28
Number of Prisoners on Hand at the Close of each Month.														July, 1,553.
														August, 1,558.
														September, 1,531.
														October, 1,530.
														November, 1,524.
														December, 1,529.
														January, 1,484.
														February, 1,446.
														March, 1,439.
														April, 1,427.
														May, 1,471.
														June, 1,515.
														Monthly average, 1,500 1/2.

NOTE.—Received, 555; discharged, 604. Decrease from July 1st, 1879, to July 1st, 1880, 49.



TABLE I—Continued.

*Recapitulation of Received and Discharged Prisoners from July 1, 1879, to July 1, 1880.*

On hand June 30th, 1879 .....	1,564	
Received from July 1st, 1879, to July 1st, 1880 .....	555	
Total .....		2,119
Discharged under the Act .....	172	
Restored under the Act .....	324	
Taken out by order of Court, as witnesses .....	14	
Taken out by order of Court, new trial .....	9	
Taken out by order of Court, new trial, new charge .....	5	
Discharged by order of Court .....	1	
Discharged by commutation .....	20	
Pardoned by the Governor .....	19	
Pardoned by the President .....	2	
Died in the prison .....	25	
Killed .....	2	
Committed suicide .....	1	
Sent to Insane Asylum .....	2	
Discharged by order of United States Commissioners .....	1	
Escaped from prison .....	7	
		604
On hand June 30th, 1880 .....		1,515
Decrease in one year .....		49

TABLE II.

*Nativity of Prisoners.*

NATIVITY.	Number.	Per Cent.	NATIVITY.	Number.	Per Cent.
<i>United States and Territories.</i>			<i>Foreign.</i>		
Alabama .....	8	.53	Austria .....	1	.07
Arkansas .....	8	.53	Australia .....	7	.46
Alaska Territory .....	1	.07	British Columbia .....	1	.07
California .....	245	16.17	China .....	261	17.22
Colorado .....	1	.07	Canada .....	29	1.91
Connecticut .....	9	.59	Chili .....	10	.66
Delaware .....	2	.13	Denmark .....	5	.33
Florida .....	3	.20	England .....	53	3.50
Georgia .....	5	.33	France .....	28	1.85
Illinois .....	25	1.65	Finland .....	2	.13
Indiana .....	20	1.32	Germany .....	63	4.16
Iowa .....	8	.53	Greece .....	1	.07
Kansas .....	2	.13	Holland .....	1	.07
Kentucky .....	20	1.32	Ireland .....	131	8.64
Louisiana .....	15	.99	Italy .....	14	.92
Maine .....	22	1.45	Mexico .....	52	3.43
Maryland .....	11	.73	Nova Scotia .....	1	.07
Michigan .....	14	.92	New Brunswick .....	3	.20
Massachusetts .....	36	2.37	Peru .....	1	.07
Missouri .....	44	2.90	Portugal .....	4	.26
Mississippi .....	1	.07	Poland .....	4	.26
New Hampshire .....	4	.26	Russia .....	4	.26
New York .....	148	9.77	Saxony .....	1	.07
New Jersey .....	12	.79	South America .....	1	.07
North Carolina .....	3	.20	Sweden and Norway .....	6	.39
Ohio .....	32	2.11	Switzerland .....	4	.26
Oregon .....	8	.53	Scotland .....	10	.66
Pennsylvania .....	42	2.77	Spain .....	3	.20
Rhode Island .....	3	.20	Sandwich Islands .....	2	.13
South Carolina .....	1	.07	Turkey .....	1	.07
Tennessee .....	16	1.05	Wales .....	3	.20
Texas .....	2	.13	West Indies .....	3	.20
Utah Territory .....	1	.07	At sea .....	2	.13
Vermont .....	3	.20			
Virginia .....	15	.99	Totals .....	712	46.99
West Virginia .....	1	.07			
Wisconsin .....	7	.46	RECAPITULATION.		
District Columbia .....	1	.07	United States .....	803	53.01
New Mexico .....	1	.07	Foreign .....	712	46.99
Washington Territory .....	3	.20			
Totals .....	803	53.01	Totals .....	1,515	100.00

TABLE III.

*Classification of Crimes.*

CRIMES.	Number.	CRIMES.	Number.
Arson .....	5	Felony .....	48
Arson, first degree .....	4	Grand larceny .....	286
Arson, second degree .....	9	Grand larceny and prior conviction ..	2
Arson and burglary .....	1	House-breaking .....	2
Attempt to commit arson .....	4	Incest .....	2
Assault to murder .....	65	Larceny .....	2
Assault to rape .....	14	Murder .....	17
Assault to rob .....	35	Murder, first degree .....	56
Assault to do great bodily injury ..	3	Murder, second degree .....	113
Assault with deadly weapon .....	26	Manslaughter .....	49
Attempt at burglary .....	25	Mayhem .....	2
Burglary .....	130	Perjury .....	5
Burglary, first degree .....	155	Petit larceny and prior conviction ..	5
Burglary, second degree .....	195	Rape .....	9
Burglary and felony .....	1	Robbery .....	160
Burglary and grand larceny .....	8	Robbery and arson .....	3
Burglary and prior conviction .....	1	Robbing United States mail .....	2
Buggery .....	3	Seduction .....	1
Counterfeiting .....	13		
Embezzlement .....	19	Total .....	1,515
Forgery .....	35		

TABLE IV.

*Terms of Imprisonment.*

TERM.	Number.	TERM.	Number.
Six months .....	3	Eleven years .....	5
One year .....	85	Twelve years .....	28
One and one-quarter years .....	3	Twelve and one-quarter years .....	1
One and one-half years .....	29	Twelve and one-half years .....	3
One and two-thirds years .....	1	Thirteen years .....	12
Two years .....	146	Fourteen years .....	20
Two and one-half years .....	29	Fifteen years .....	47
Three years .....	165	Fifteen and one-quarter years .....	1
Three and one-quarter years .....	1	Sixteen years .....	1
Three and one-half years .....	25	Seventeen years .....	3
Three and ten-twelfths years .....	1	Eighteen years .....	6
Four years .....	148	Nineteen years .....	1
Four and one-half years .....	11	Twenty years .....	20
Four and three-quarters years .....	1	Twenty-one years .....	4
Five years .....	220	Twenty-one and one-half years .....	1
Five and one-quarter years .....	1	Twenty-two years .....	2
Five and one-half years .....	4	Twenty-four years .....	3
Six years .....	71	Twenty-five years .....	12
Six and one-half years .....	1	Twenty-seven and one-half years ..	1
Seven years .....	65	Twenty-eight years .....	1
Seven and one-half years .....	10	Thirty years .....	5
Seven and three-quarters years .....	1	Thirty-four years .....	1
Eight years .....	49	Forty years .....	1
Eight and two-thirds years .....	1	Forty-five years .....	2
Nine years .....	15	Life .....	106
Nine and one-half years .....	1		
Ten years .....	140	Total .....	1,515
Ten and one-half years .....	1		

TABLE V.

*Age of Prisoners.*

AGE.	Number.	AGE.	Number.
Fifteen years .....	1	Forty-four years .....	20
Sixteen years .....	2	Forty-five years .....	14
Seventeen years .....	16	Forty-six years .....	29
Eighteen years .....	17	Forty-seven years .....	29
Nineteen years .....	49	Forty-eight years .....	18
Twenty years .....	54	Forty-nine years .....	15
Twenty-one years .....	47	Fifty years .....	17
Twenty-two years .....	50	Fifty-one years .....	16
Twenty-three years .....	67	Fifty-two years .....	9
Twenty-four years .....	54	Fifty-three years .....	9
Twenty-five years .....	58	Fifty-four years .....	5
Twenty-six years .....	67	Fifty-five years .....	10
Twenty-seven years .....	49	Fifty-six years .....	5
Twenty-eight years .....	57	Fifty-seven years .....	6
Twenty-nine years .....	78	Fifty-eight years .....	7
Thirty years .....	66	Fifty-nine years .....	2
Thirty-one years .....	75	Sixty years .....	3
Thirty-two years .....	51	Sixty-one years .....	6
Thirty-three years .....	50	Sixty-two years .....	4
Thirty-four years .....	51	Sixty-three years .....	3
Thirty-five years .....	48	Sixty-four years .....	1
Thirty-six years .....	48	Sixty-five years .....	1
Thirty-seven years .....	38	Sixty-six years .....	1
Thirty-eight years .....	34	Sixty-seven years .....	1
Thirty-nine years .....	39	Sixty-eight years .....	3
Forty years .....	38	Sixty-nine years .....	1
Forty-one years .....	30	Seventy years .....	1
Forty-two years .....	23	Seventy-one years .....	1
Forty-three years .....	22	Seventy-two years .....	3
		Seventy-three years .....	1
		Seventy-four years .....	1
		Seventy-five years .....	1
		Seventy-six years .....	1
		Seventy-seven years .....	1
		Seventy-eight years .....	1
		Seventy-nine years .....	1
		Total .....	1,515

TABLE V.—Continued.

*Educational Abilities of Prisoners.*

Read and write .....	1,035
Read and cannot write .....	27
Neither read nor write .....	453
Total .....	1,515

TABLE VI.

*Number of Prisoners from each County.*

COUNTY.	Number.	Per Cent.	COUNTY.	Number.	Per Cent.
Alpine.....	1	.07	San Bernardino.....	18	1.19
Alameda.....	63	4.15	San Diego.....	23	1.52
Amador.....	13	.85	San Francisco.....	476	31.41
Butte.....	38	2.51	San Joaquin.....	75	4.95
Calaveras.....	18	1.19	San Luis Obispo.....	12	.79
Colusa.....	20	1.32	San Mateo.....	11	.72
Contra Costa.....	17	1.12	Santa Barbara.....	12	.79
Del Norte.....	3	.20	Santa Clara.....	60	3.96
El Dorado.....	15	.99	Santa Cruz.....	15	.99
Fresno.....	19	1.25	San Benito.....	13	.85
Humboldt.....	15	.99	Shasta.....	25	1.65
Inyo.....	6	.39	Sierra.....	5	.33
Kern.....	37	2.44	Siskiyou.....	20	1.32
Lake.....	4	.26	Solano.....	27	1.78
Lassen.....	2	.13	Sonoma.....	46	3.04
Los Angeles.....	67	4.53	Stanislaus.....	14	.92
Marin.....	8	.52	Sutter.....	5	.33
Mariposa.....	8	.52	Tehama.....	17	1.12
Mendocino.....	7	.46	Trinity.....	2	.13
Merced.....	20	1.32	Tulare.....	17	1.12
Mono.....	1	.07	Tuolumne.....	7	.46
Monterey.....	21	1.38	Ventura.....	8	.52
Nevada.....	29	1.91	Yuba.....	33	2.17
Napa.....	20	1.32	Yolo.....	19	1.25
Placer.....	23	1.52			
Plumas.....	5	.33			
Sacramento.....	75	4.95	Total.....	1,515	100.00

TABLE VII.

*Occupation of Prisoners when Received.*

OCCUPATION.	Number.	OCCUPATION.	Number.
Baker .....	15	Lawyer .....	1
Brickmaker .....	3	Laundryman .....	4
Bricklayer .....	4	Lumberman .....	1
Bookkeeper .....	10	Molder .....	6
Barkeeper .....	3	Miner .....	38
Barber .....	15	Merchant .....	4
Blacksmith .....	13	Miller .....	1
Boilermaker .....	1	Marble cutter .....	1
Bootblack .....	1	Machinist .....	8
Brushmaker .....	1	Musician .....	3
Broommaker .....	1	Pressman .....	1
Boxmaker .....	1	Printer .....	13
Butcher .....	23	Plumber .....	2
Boatbuilder .....	1	Peddler .....	2
Cook .....	115	Potter .....	1
Carpenter .....	35	Plasterer .....	4
Cigarmaker .....	17	Painter .....	19
Clerk .....	30	Physician .....	1
Confectioner .....	1	Railroad employé .....	3
Cabinetmaker .....	6	Ship carpenter .....	2
Chairmaker .....	1	Sash maker .....	1
Cooper .....	7	Seamstress .....	1
Civil engineer .....	1	School teacher .....	1
Copyist .....	1	Stone mason .....	2
Domestic .....	1	Sailor .....	35
Druggist .....	4	Steward .....	1
Dentist .....	1	Servant .....	4
Dyer .....	3	Stenographer .....	1
Engineer .....	12	Stonecutter .....	4
Farmer .....	60	Saloon keeper .....	3
Fisherman .....	1	Salesman .....	1
File cutter .....	1	Soldier .....	1
Florist .....	1	Shoemaker .....	28
Fireman .....	8	Sailmaker .....	2
Gambler .....	1	Turner .....	1
Gardener .....	8	Teamster .....	30
Gasfitter .....	1	Tobacconist .....	1
Glazier .....	2	Tailor .....	17
Glassblower .....	1	Telegraph operator .....	3
Gunsmith .....	1	Tinsmith .....	4
Glovesmaker .....	1	Upholsterer .....	7
Grocer .....	1	Vaquero .....	12
Harnessmaker .....	3	Washman .....	52
Hostler .....	16	Wheelwright .....	1
Herder .....	1	Waiter .....	27
Horseshoer .....	2	Watchman .....	1
Housekeeper .....	2	Whipmaker .....	1
Hack driver .....	1	Watchmaker .....	1
Ironer .....	3		
Laborer .....	715	Total .....	1,515

TABLE VIII.

*Number of Terms.*

TERM.	Number.	TERM.	Number.
Prisoners serving their first term.....	1,148	Prisoners serving their sixth term....	5
Prisoners serving their second term.....	237	Prisoners serving their seventh term....	2
Prisoners serving their third term.....	76	Total .....	1,515
Prisoners serving their fourth term.....	27		
Prisoners serving their fifth term.....	20		

TABLE IX.

*Statement of Clothing, etc., Issued to Prisoners by Turnkey's Department from July 1, 1879, to July 1, 1880.*

DATE.	PANTS.		SHIRTS.		Shoes	Hats	Blankets	Yards of Bed Tickings	Beds	Office Boots and Shoes	Repairs
	Woollen	Citizen	Woollen	Citizen							
1879.											
July .....	209	13	206	48	189	112	31	225½	69	21	26
August .....	305	18	300	41	271	115	60	238½	83	23	25
September .....	191	18	198	38	177	99	42	315½	112	14	30
October .....	302	11	288	42	195	129	78	287½	98	17	36
November .....	306	10	314	31	237	121	117	337½	97	29	21
December .....	290	14	285	30	235	146	152	365½	119	23	37
1880.											
January .....	166	19	162	24	179	99	26	255	45	37	32
February .....	231	16	223	57	212	110	45	259½	81	18	35
March .....	195	16	182	49	220	110	71	244½	109	52	37
April .....	303	20	282	47	253	135	80	246¾	81	27	48
May .....	327	16	338	81	274	139	121	398½	142	19	46
June .....	305	9	265	76	236	116	144	575¾	148	13	55
Totals .....	3,130	180	3,034	564	2,678	1,431	967	3,748½	1,184	293	428

NOTE.—Issued during the year—knit jackets, 134; issued to prisoners, upon their discharge from the prison, during the months of April, May, and June, and made to order, 84 coats, 65 vests, and 18 pairs of pants.

I remain, respectfully,

A. G. HINMAN, Turnkey.

CALIFORNIA STATE PRISON, SAN QUENTIN, July 1st, 1880.





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# REPORT OF PHYSICIAN.

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# PHYSICIAN'S REPORT.

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HOSPITAL DEPARTMENT, SAN QUENTIN PRISON, }  
July 1st, 1880. }

*To Hon. J. P. Ames, Warden:*

DEAR SIR: I have the honor to submit to you, herewith, an annual report, the result of my observation and experience in the management of the affairs of the Hospital Department of the State Prison, for the year ending June 30th, 1880.

Having entered upon the discharge of the duties of my office at the beginning of the last quarter of the thirty-first fiscal year, I have found it impracticable to make as complete and satisfactory a report of the affairs of the Hospital Department as, under better circumstances, I might have done.

I have compiled—principally from such records as were furnished by my predecessor—a tabular statement of the prevalent diseases and the deaths occurring among the prisoners, for the fiscal year just ended, and the causes thereof; to which I respectfully call your attention.

The tabular statement No. I is an exhibit of all diseases that have been treated in the prison.

Statement No. II shows the list of deaths occurring, and causes.

Statement No. III is a comparative table of prisoners treated, and cost of drugs and medicines.

The number of deaths that occurred during the year cannot be justly regarded as a high rate of mortality, when it is considered that many of the convicts are afflicted with chronic diseases when admitted, or with broken-down constitutions, from exposure and dissipation incident to a career of vice and crime.

It will be observed that the prison has been almost entirely free from diseases of a miasmatic or malarial origin; the reason of which is readily explained by the favorable hygienic condition, mild climate, abundant supply of pure water, and the excellent system of sewerage.

So far as my observation extends, there is only one defect in the sewerage system in the prison, and that, as you have suggested, may be remedied by the erection of a ventilating shaft near the outlet of the main sewer, to act as a draft that will carry off the sewer gas as fast as generated, at such times as when the influx of the flood tides prevent the continuous flow that guards against the noxious gases arising from the open gratings.

On entering upon my duties I found the hospital crowded to its utmost capacity; many of the patients were found free from any real disease, and they were discharged to give place to others—sick and receiving treatment outside of hospital.

In addition to the improvements already carried out necessary to better the condition of the sick, I would call your attention to the need of a system of thermal baths for general use, to be closed and perfected, so as to provide better facilities for enforcing personal cleanliness.

The present open air cold water baths are of sufficient capacity, but there is a class of prisoners of low vitality, and so enfeebled as not to be able to endure the cold water baths in open air without the hazard of contracting diseases incident to such vicissitudes of temperature. I would therefore recommend that the above suggested improvements be made as early as practicable.

In concluding my report I wish to draw your attention to the improved physical condition of the convicts, superinduced by the improved quality and abundant supply of food provided; the excellent hygienic condition of the prison, the better government of all classes of criminals, the impartial medical attention without extravagance, and you will allow me to thank you for your generous confidence; and to express my personal obligations for your cordial support in all reformatory measures that belong to my province, in the endeavors to improve the condition of the prisoners, and the general health of the many convicts under your charge.

Respectfully submitted.

L. H. CARY, M. D.,  
Resident Physician and Surgeon.

## STATEMENT I.

*Annual Report of Prevalent Diseases in California State Prison.*

DISEASE.	Quarter ending Sept 30, 1879.	Quarter ending Dec. 31, 1879.	Quarter ending Mar. 31, 1880.	Quarter ending June 30, 1880.	Totals
Abscess.....	2	2		1	5
Asthma.....	3		2	3	8
Aneurism.....	1	1			2
Anæmia.....	4	1		2	7
Burns.....		1	3	1	5
Bronchitis.....	5	3	4	3	15
Contusions and sprains.....	13	13	9	8	43
Cancer.....	1	1	1		2
Consumption, pulmonary.....	3	1	5	1	10
Colic.....	3	1		3	7
Catarrh.....	5	2	1		8
Constipation.....	7	2	5	4	18
Diphtheria.....			1		1
Dysentery.....	3	2	1	1	7
Diarrhea.....	8	4	2	3	17
Diabetes.....	2	1		3	6
Dropsy.....		2		1	3
Dyspepsia.....	3	1	2	2	8
Eczema.....	1	3			4
Erysipelas.....				1	1
Epilepsy.....	1				1
Enteritis.....	2	1		3	6
Fistula in ano.....	1		2	3	6
Fever, malarial.....	4	4	4	4	16
Fever, typhoid.....	1	2	1		4
Gonorrhœa.....			2	1	3
Hemorrhoids.....	3	2	4	1	10
Hæmoptysis.....		1	3	1	5
Hernia.....		1	3	2	6
Heart disease.....	7	3	3	2	15
Hepatitis.....	1		2	1	4
Insanity.....	1	2	2	1	6
Influenza.....	4	8	3	2	17
Mumps.....		2	1		3
Neuralgia.....	6	5	11	3	25
Orchitis.....	1	3	2	1	7
Otitis.....		1		2	3
Ophthalmia.....	3	1	1	2	7
Paralysis.....	1		2	1	4
Pyæmia.....	1	1	3	1	6
Pneumonia.....	3		3	3	9
Pleurisy.....	1		2		3
Peritonitis.....			1	1	2
Poisoning.....			1	2	3
Sciatica.....	1			1	2
Syphilis.....	4	5	2	1	12
Stricture.....	2	1	5	1	9
Tapeworm.....		1	2	1	4
Tumors.....	2	4	3	1	10
Wounds, lacerated.....	8	11	6	7	32

## STATEMENT II.

DATE.	Classified Diseases.	Unclassified Diseases.	Total	Patients treated in Hospital	Patients treated outside of Hospital	Total	Patients admitted into Hospital	Patients discharged from Hospital.	Deaths.
Quarter ending Sept. 30th, 1879	122	424	546	42	489	531	25	20	12
Quarter ending Dec. 31st, 1879	99	557	656	30	610	640	20	10	7
Quarter ending March 31st, 1880	110	385	495	42	479	521	29	17	3
Quarter ending June 30th, 1880	86	169	255	42	218	260	20	22	4
Totals	417	1,535	1,952	156	1,796	1,952	94	69	26

## STATEMENT III.

## Number of Deaths.

Nativity.	DISEASE.	Date.
Ireland	Abscess prostate gland	July 13, 1879.
Ireland	Consumption	July 13, 1879.
Germany	Rheumatism	July 21, 1879.
America	Incised wound	August 6, 1879.
Mexico	Bronchitis	August 20, 1879.
America	Aneurism	August 20, 1879.
Indian	Consumption	August 22, 1879.
America	Heart disease	August 22, 1879.
China	Consumption	September 8, 1879.
Mexico	Syphilis	September 12, 1879.
America	Incised wounds	September 17, 1879.
Ireland	Heart disease	September 17, 1879.
Ireland	Heart disease	October 2, 1879.
China	Hæmoptysis	October 20, 1879.
Mexico	Consumption	November 3, 1879.
England	Consumption	November 21, 1879.
China	Aneurism	November 23, 1879.
Mexico	Bronchitis	December 20, 1879.
America	Rheumatism	December 21, 1879.
Ireland	Consumption	January 21, 1880.
Ireland	Consumption	February 20, 1880.
Mexico	Rheumatism	March 11, 1880.
China	Consumption	April 6, 1880.
America	Consumption	April 14, 1880.
Mexico	Abscess, scrofulous	April 16, 1880.
Ireland	Typhoid pneumonia	May 1, 1880.
Total		26.

## DEATHS.

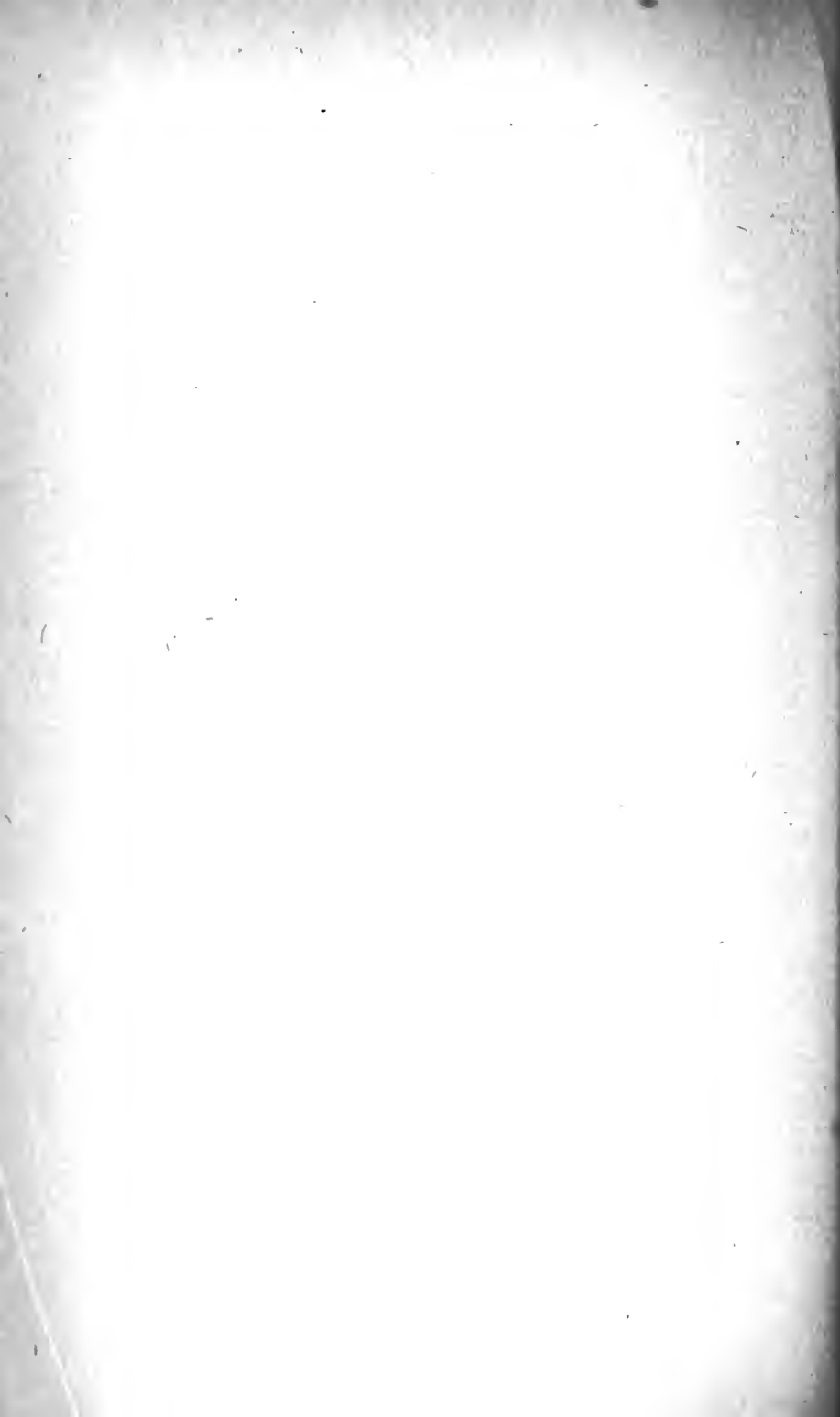
Accident .....	1
Homicide .....	2
Natural causes .....	23
Total .....	26
Percentage of deaths to total number of prisoners .....	1.7
Percentage of deaths to sick .....	1.33
Percentage of deaths to classified diseases .....	6.2
Percentage of deaths to sick treated in hospital .....	16.6

## RECAPITULATION OF DEATHS.

DISEASES.	Number.	NATIVITY.	Number.
Abscess .....	2	America .....	6
Aneurism .....	2	China .....	4
Bronchitis .....	2	England .....	1
Consumption .....	9	Germany .....	1
Heart disease .....	3	Ireland .....	7
Hæmoptysis .....	1	Indian .....	1
Incised wounds .....	2	Mexico .....	6
Rheumatism .....	3		
Syphilis .....	1	Total .....	26
Typhoid pneumonia .....	1		
Total .....	26		

## SURGEON'S SUMMARY.

	Quarter ending Sept. 30, 1879.	Quarter ending Dec. 31, 1879.	Quarter ending Mar. 31, 1880.	Quarter ending June 30, 1880.	Total for one year .....
Average number of convicts in prison ..	1,547	1,527	1,489	1,471	1,501
Number of men employed in contract shop .....	264	328	283	276	-----
Number of visits to Physician from men employed in shops .....	4,323	4,565	4,567	2,491	15,935
Daily average .....	48	57	56	27	-----
Number of contract men excused from work .....	985	1,230	967	393	3,575
Daily average .....	11	14	11	4	-----
Loss to State by reason of contract men excused .....	\$492 50	\$615 00	\$482 50	\$196 40	\$1,787 50
Cost to State for prescriptions filled, at fifteen cents each .....	684 45	648 60	683 55	373 65	2,390 25
Totals .....	\$1,140 95	\$1,299 60	\$1,167 05	\$570 15	\$4,177 75
Cost to State for drugs and medicines ..	\$755 26	\$841 50	\$857 74	\$472 92	\$2,927 42

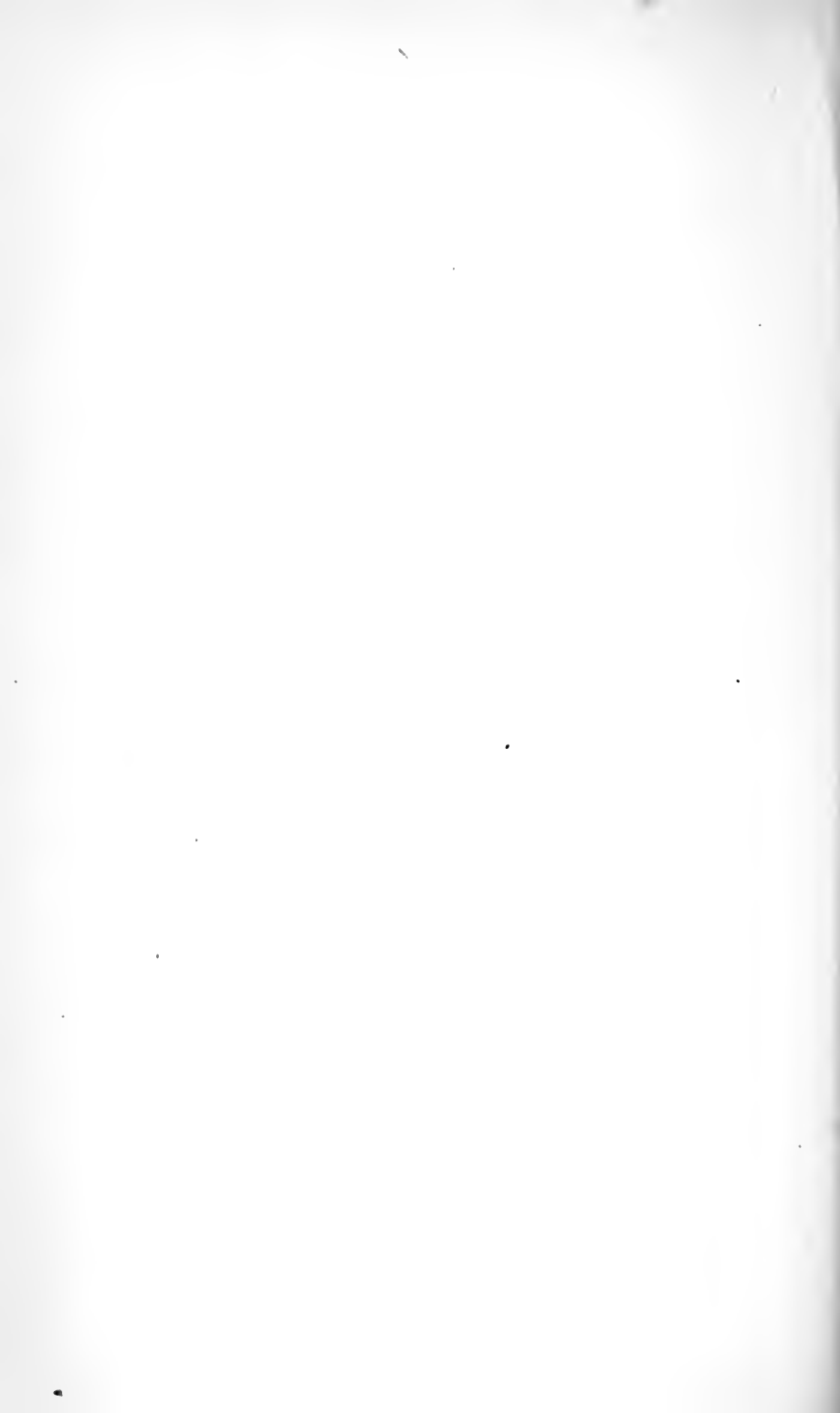




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## REPORT OF THE MORAL INSTRUCTOR.

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## REPORT OF THE MORAL INSTRUCTOR.

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*Hon. J. P. Ames, Warden :*

DEAR SIR: I have the honor to submit to you, in compliance with the State regulations, the report of the Moral Instructor, with the usual statistics for the fiscal year ending June 30th, 1880.

In offering this, my first report, allow me to state that I have been in charge of the department of the Moral Instructor since the first of March, 1880. During the previous eight months it was presided over by Prof. C. C. Cummings.

From the records of my predecessor, it is shown that there were in attendance forty-one pupils in the school; sixty have been admitted during the course of the year, and forty-eight dismissed, the latter mostly from expiration of sentence, leaving thirty-three on the roll of pupils on the thirtieth day of June.

The pupils are graded into four classes, according to their mental advancement. Each class has its own separate teacher, and I have, so far as relates to my administration, the pleasure of assuring you that each teacher has given faithful attention to his class, thus aiding me in my efforts to materially advance the youths and young men under my charge towards the accomplishment of reformation, while receiving the benefits of a good plain schooling. The discipline in the school has improved from that in which I found it, until now there is but little refractory or disrespectful disposition evinced at any time. A large proportion of the pupils entering had not even been taught to read and write; most of them show an eagerness to learn, and many are discharged upon expiration of sentence, possessing a tolerably fair education.

The total number of volumes in the prison library, as given in the following statement, includes a large number in a dilapidated condition. The book bindery is constantly engaged in repairing such books, and making up into volumes the contributions of magazines. We are gradually, however, receiving accessions of books in the way of purchase and donation.

There are no means yet devised to reach the main body of the prisoners at large to effect their reformation. This I deeply regret.

We had no funeral services connected with deceased prisoners, when I took charge of my department, to remind the living that they belonged to the human family, and were in a civilized nation. I rejoiced when you authorized me, in May, to have such services in all cases of death, but no occasion presented itself requiring such services, until July second, two days after the expiration of the year. Our chapel, or school-room, is so limited that only 315 persons can be comfortably seated, while all the balance, some 1,200, on the average, are virtually excluded. I hope that in the near future this great

defect will be remedied, and that the sphere of the Moral Instructor's influence will be so enlarged that he can preach the Gospel of the Son of God to all who are in the prison.

I am pleased to witness a general disposition on the part of the prisoners to obedience, and their appreciation of kindness toward them on the part of the Warden and officers of the prison. Those who do attend our religious services on Sunday mornings, conduct themselves with decorum and respect, giving assurance that if all were to attend, the religious instructions imparted would be more general in its influence in the work of reform.

Very respectfully yours,

H. CUMMINGS,  
Moral Instructor.

### STATISTICS

*From the Department of the Moral Instructor, for the Fiscal Year ending June 30, 1880.*

MONTHS.	VOLUMES IN LIBRARY AND ACCESSIONS.					CIRCULATION.				BOOK BINDERY.	
	Volumes on hand First of Month	Accessions received	Total	School Books Re- ceived	Newspapers Re- ceived	Romance and Stories	Bound Magazines	All other Classes	Total	Books Repaired	Magazines Bound
1879.											
July	3,118	41	3,159		1,530	1,077	498	547	2,122	86	
August	3,159	33	3,192		1,700	998	414	565	1,977	70	27
September	3,192	263	3,395		2,130	858	377	489	1,724	57	
October	3,395	58	3,453	45	410	932	298	493	1,723	81	
November	3,453	8	3,461	13	1,115	1,000	298	532	1,830	59	
December	3,461	13	3,474			960	304	475	1,739	31	3
1880.											
January	3,474	148	3,622	32	2,723	999	382	539	1,920	4	16
February	3,622	7	3,629		176	791	297	446	1,534	70	
March	3,629	30	3,659		800	736	265	547	1,548	52	23
April	3,659	18	3,677		400	710	307	504	1,521	29	13
May	3,677	86	3,763		2,100				1,450	37	15
June	3,763	30	3,793		1,320				1,084	39	3
Totals		675	3,793	90	14,404				20,172	615	102

# Supplemental Report of San Quentin Prison,

From June 30, 1880, to October 31, 1880.

## SUPPLEMENTAL REPORT,

CALIFORNIA STATE PRISON, SAN QUENTIN.

*Statement of Cash Receipts for the Four Months Ending October 31, 1880.*

State treasury .....	\$55,114 50	
State treasury, for the purchase of land .....	15,616 00	
Merchandise, laundry, shoes, etc. ....	7,126 75	
Prison Library—gate money from visitors.....	300 55	
From prisoners .....	1,522 55	
Sale of brick .....	1,614 25	
Sale of hogs .....	30 00	
Forage .....	91 25	
Labor .....	11,161 50	
United States .....	5,179 55	
Total .....		\$97,756 90

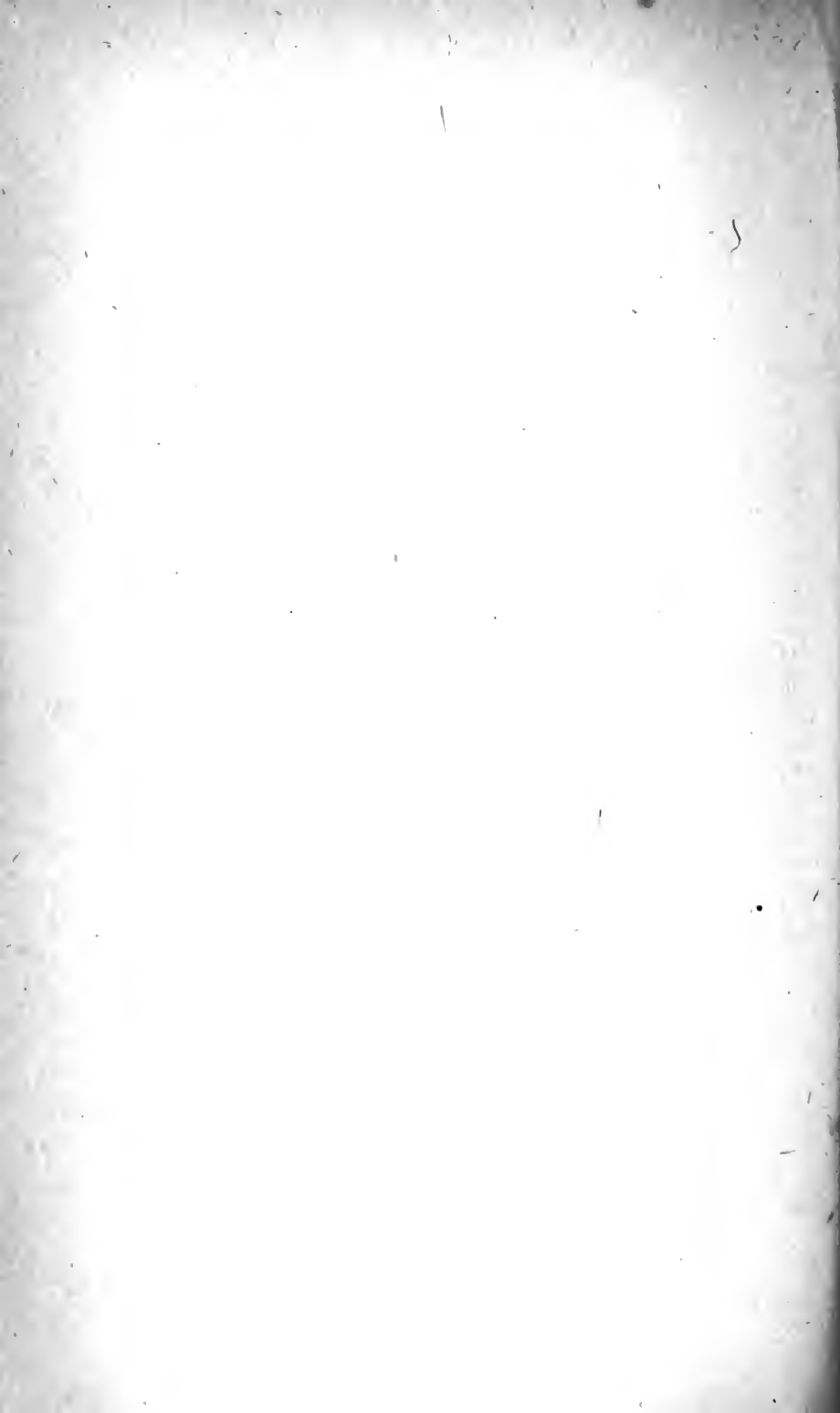
*Disbursements.*

Merchandise .....	\$53,155 86	
Land purchased .....	15,616 00	
Water .....	4,000 00	
Salaries of officers, guards, etc. ....	13,667 72	
Discharged prisoners .....	674 00	
Transportation of prisoners .....	482 00	
Allowance to prisoners .....	119 50	
General expense .....	538 40	
N. P. Co. R. R., freight on lumber, wood, etc. ....	713 74	
Labor .....	19 75	
Brick account .....	883 00	
To prisoners .....	2,957 30	
Gas account .....	2,067 89	
San Francisco Office, Board of Directors .....	120 22	
United States .....	30 00	
Live stock .....	390 00	
Subsistence to officers in lieu of board .....	492 40	
Interest and discount .....	1,781 33	
Total .....		\$97,709 11
By cash to balance .....		\$47 79

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# Report of Warden of the State Prison at Folsom.

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# REPORT OF WARDEN.

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STATE PRISON AT FOLSOM, November 1st, 1880.

*To the honorable Board of Prison Directors of California:*

GENTLEMEN: I have the honor to present herewith my report of the operation and management of the State Prison at Folsom, to October 31st, 1880.

In accordance with your directions, on March 2d, 1880, I took charge of the work of construction in the capacity of Superintendent. My predecessor, Mr. J. W. Duncan, turned over to me the property under his charge belonging to the State. This property, and its estimated value, are fully detailed in Table One of the Clerk's report, accompanied herewith. The May pay-roll shows fifty men—mechanics and laborers—employed at a cost of \$1,822 58. The June pay-roll shows eighty men, at a cost of \$4,046 90. The July pay-roll shows forty-eight men, at a cost of \$1,946 31. The August pay-roll shows twenty-five men, employed at a cost of \$1,246 09. The pay-roll of September shows eight men, at a cost of \$664; and of October, ten men, at a cost of \$708 25. The slight advance in the October expense was occasioned by the employment of additional stonecutters, to complete the boiler house.

On the fifteenth day of July my duties as Superintendent ended, and those of Warden began. On the twenty-sixth day of July, pursuant to an order of the Board of Directors, there were transferred from the prison at San Quentin to this prison 44 prisoners; August 23d, 52 prisoners; September 6th, 52 prisoners; and September 30th there were transferred 52 prisoners, and 10 committed by order of Court, making a total of 210.

As soon after the reception of the first prisoners as was practicable, the employment of free labor was dispensed with, and convict labor substituted therefor. From September 1st there have been regularly employed on the construction, only one general foreman, one foreman blacksmith, one foreman plasterer, one foreman stone mason, one foreman carpenter, one foreman at artesian well, one foreman of laborers, and one foreman at quarry. The employment of these I find necessary for the proper direction of the prisoners' labor. Each of these foremen above mentioned, except the general foreman, is required to perform a regular day's work, to whatever employment he is assigned.

The following statement will show, principally, what has been accomplished to date: Since the work was begun, May 1st, 1880, 50,000 cubic feet of earth and rock have been filled in cells and corridors in prison building; 7,000 cubic feet of rock excavation for

sewer pipe; 7,000 cubic feet of earth excavation for sewer pipe; 9,000 cubic feet of earth excavation for reservoir; 800 square feet of stone, dressed and placed, flagging; 500 square feet of stone, dressed and placed, for stairs; 4,320 cubic feet of stone wall for reservoir; 1,960 cubic feet of stone wall for engine and boiler house; 5,760 cubic feet of stone wall for sewer in ravine; 1,200 cubic feet of stone wall for sewer under barn.

The reservoir is 36x24x12, with three-foot walls, and its capacity is 53,000 gallons. The boiler house is 44x20x14, with twenty-inch walls. The barn and stables are of wood, 40x76 and 17 feet high to the eaves. One guard-house for the Lowell battery gun has been completed, the dimensions of which are 12x12 feet and 18 feet high.

A stone sewer is being constructed in the ravine between the prison and the quarry, three feet wide and eight feet high, with three feet walls capped with flags two feet thick and six feet in length; one hundred and twenty feet of which have been completed. This sewer, when completed, will be 850 feet in length. As the supply of water for daily consumption—about 50,000 gallons—is required to be pumped into the reservoir from the river at considerable expense, pursuant to your orders, the work of sinking an artesian well has been commenced and already sunk to the depth of 125 feet.

There have been about 4,000 yards of lathing done, and about 4,000 yards of two-coat plastering. Cement floors have been laid in twenty-three cells, in water closets, and in the tailor and shoe shops, amounting in all, to 2,892 square feet. The whole interior of the cell building has been whitewashed. The entire ceiling over the central corridor has been removed to afford better light and ventilation. About 22,000 yards of surface have received two coats of paint. The roofs of the prison building constitute the larger portion of this. In addition to the 22,000 yards, there have been painted 288 cell doors, 1,600 linal feet iron railing in corridors, and all the entrance and exit iron doors and gates; also all the iron grated windows. There have been laid 930 feet of sewer pipe outside, and 386 feet inside of the building, 1,100 feet 4-inch iron water pipe from the river to the reservoir, and 400 feet same size and kind from the reservoir to the prison; also about 350 feet of smaller pipe necessary to supply water for outside dwellings, barn, and stables. There has been placed in position a steam boiler large enough to supply steam for cooking and heating, a house for which is now being built of ashler stone similar to the prison building walls. One hundred iron bedsteads have been set up, which were made by prison labor at San Quentin. Holes have been drilled for bolts in the stone jambs of 162 cells. At your meeting, September 23d, you ordered that a defect in the ventilation of the cells be remedied, which order is now being executed. Forty-two cell doors at this date have been drilled to admit sufficient air, each door having six one and one-half inch apertures.

The plumbing so far has cost about \$2,500. I estimate a further outlay of \$500 to complete that part of the work.

Aside from the foregoing, there have been laid by contract 3,160 square feet of cement floors, baking oven in prisoners' bakery, 920 yards plastering, and the necessary cooking vats, and other like furnishing. Also, a large amount of work done upon the prison grounds, which has not been herein specified.

Our armament consists of one Lowell battery gun, one six-pounder

brass howitzer, both of which are mounted in proper and commanding positions; 18 Winchester rifles, and 16 army revolvers.

The prisoners are employed as follows: Barbers, 3; bakers, 2; blacksmiths, 3; carpenters, 8; cart driver, 1; cell tenders, 4; cooks, 4; kitchen help, 3; laborers, 71; mattress maker, 1; mortar mixers, 5; painters, 5; plumber, 1; stableman, 1; Clerk's office, 1; Commissary Department, 2; engineer, 1; firemen, 4; gate keepers, 4; guard and guard officers, 4; hod carriers, 4; shoemakers, 4; sweepers, 2; tailors, 4; Warden's house, 2; waiters, 5; whitewashers, 5; washmen, 5; partially disabled, 50—fit for light duty. Total, 209.

The general health of the prisoners has been such as to warrant the belief that the locality of the prison is not so unhealthy as has been generally imputed.

For an official report of the health of the prisoners you are referred to the accompanying report of the prison surgeon and physician, Dr. W. A. Grover. For a complete and detailed statement of the financial affairs of the prison, you are referred to the accompanying report of the Prison Clerk, John M. Miner.

Commissary details, and the prison statistics, also appear in the Clerk's report.

The seemingly large rate per day of the maintaining cost of the prison is explained by the fact that in the beginning it must necessarily cost much more to operate an institution of this kind than it does after everything has been properly systematized. We could maintain a very much larger number of prisoners without materially increasing our official force.

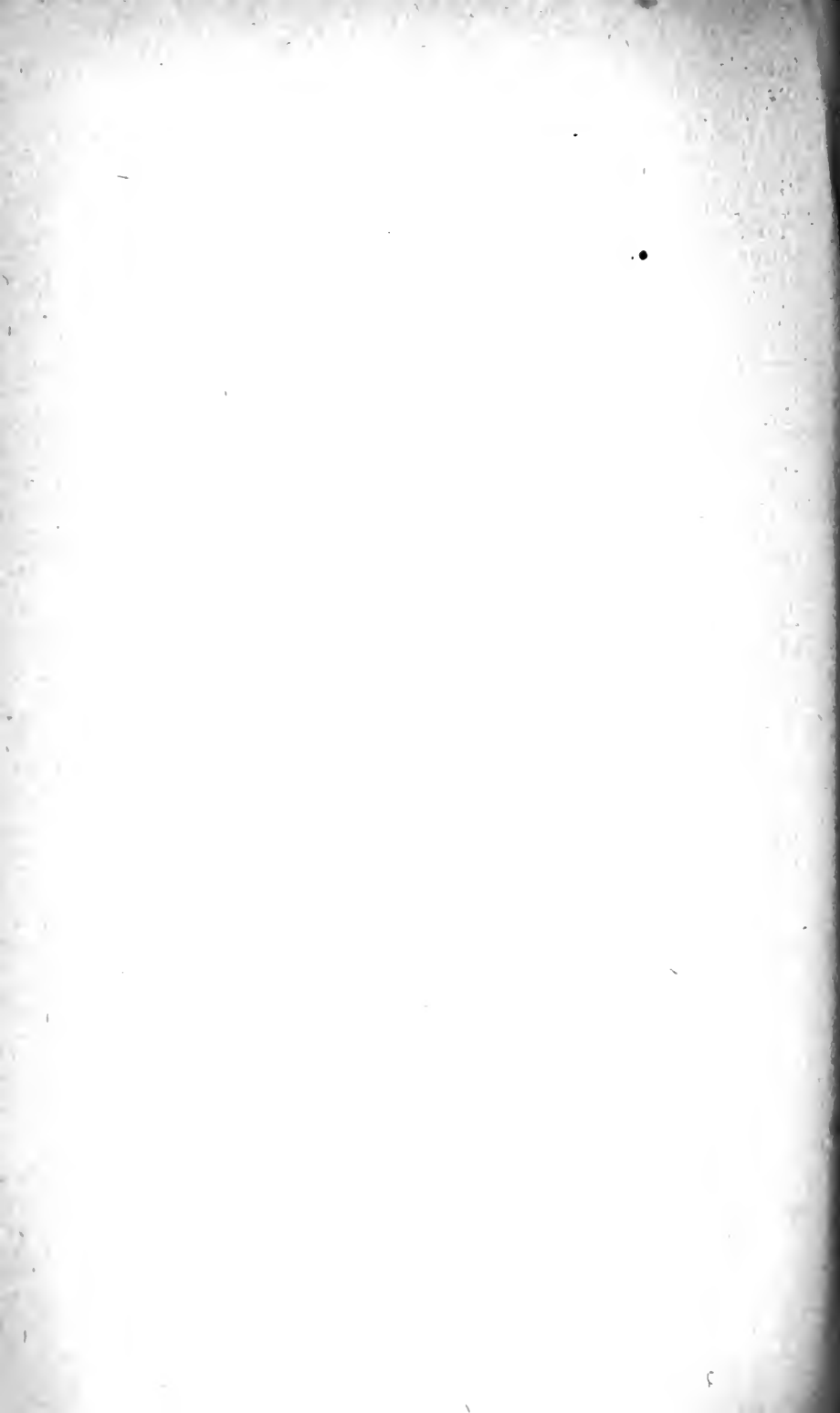
By reference to Table Six of the Clerk's report, it will be seen that the cost is steadily decreasing, and I hope that it will soon compare favorably with other similar institutions.

While I have been impressed with the importance of attending diligently to the material interests your honorable Board has intrusted to my care, I have also fully realized my responsible duty to the prisoners committed to my charge. The officers have done their duty, which has been, and still is, more than ordinarily onerous, it being creative as well as operative.

I cannot close this—perhaps too lengthy report—without expressing a word of approval of the conduct of the prisoners. With but few exceptions they have been orderly, faithful to their work, and obedient to the rules.

Very respectfully, yours,

THOMAS C. POCKMAN,  
Warden of the State Prison at Folsom.



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# Report of the Clerk of the Folsom State Prison.

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# CLERK'S REPORT.

TABLE ONE.

*Property Received from former Board of Directors.*

Items.	Amount.
Prison building .....	\$275,000 00
1. Derricks and fixtures .....	4,305 00
2. Machinery .....	3,109 57
3. Tools .....	1,660 96
4. Pipes and fittings .....	101 11
5. Merchandise .....	223 69
6. Railroad material .....	509 81
7. Wooden buildings .....	829 54
8. Live stock .....	375 00
9. Harness .....	10 00
10. Furniture .....	30 00
Total .....	\$286,154 68

NOTE.—Items numbered 1 to 10 are entered at their present valuation. The difference between that and their original cost forms part of the amount charged to prison building.

TABLE TWO.

*Value and Position of Real Estate.*

Property.	Value.	Amount paid.
Real estate .....	\$15,000 00	
To Natoma Water and Mining Company .....		\$15,000 00

TABLE THREE.

*Statement Old Fund Folsom Branch Prison.*

Date.	Source and Purpose.	Received.	Paid.
1880.			
February 26.	Received from State Treasury .....	\$5,822 36	
February 26.	Paid W. Gutenberg, iron work .....		\$3,807 00
February 26.	Paid Terrill & Slaven, wood work .....		1,202 36
February 26.	Paid Whittier, Fuller & Co., paints .....		613 00
February 26.	Paid J. W. Duncan, salary, Superintendent .....		200 00
March 3	Received from State Treasury .....	346 50	
March 3	Paid J. J. Gleason, plumbing .....		346 50
March 18	Received from State Treasury .....	1,302 87	
March 18	Paid J. W. Duncan, salary, Superintendent .....		300 00
March 18	Paid J. J. Gleason, plumbing .....		541 72
March 18	Paid labor and merchandise .....		461 15
April 28	Received from State Treasury .....	607 07	
April 28	Paid labor .....		291 62
April 28	Paid T. C. Pockman, salary, Superintendent .....		300 00
April 28	Paid merchandise .....		16 95
April 28	Paid lumber .....		8 50
June 10	Received from State Treasury .....	1,056 52	
June 10	Paid J. W. Duncan, services in adjusting old claims .....		45 00
June 10	Paid J. J. Gleason, on his claim of \$1,150 .....		145 93
June 10	Paid W. Gutenberg & Co., on their claim of \$5,615 40 .....		712 59
June 10	Paid same, on their claim of \$1,200 .....		153 00
	Totals .....	\$9,145 32	\$9,145 32

TABLE FOUR.

*Statement of Present Construction Fund.*

Purpose.	Paid Out.	Received.
By appropriation .....		\$40,000 00
Labor payrolls .....	\$10,434 13	
Plumbing .....	1,785 48	
Union gas machine .....	1,612 50	
Hardware .....	460 99	
Blacksmithing .....	89 63	
Iron and iron work .....	431 85	
Castings .....	85 05	
Gongs, bells, and fixtures .....	67 50	
Nails .....	154 55	
Zinc ventilators .....	115 50	
Cement .....	1,819 25	
Lime .....	316 93	
Plaster Paris and white sand .....	45 00	
Hair .....	71 40	
Paints, oils, etc. ....	466 90	
Sewer pipe and tiles .....	787 71	
Fire brick and clay .....	34 00	
Brick .....	196 80	
Cement floors—contract .....	396 00	
Baking oven—contract .....	203 00	
Plastering—contract .....	220 50	
Cooking vats and tables .....	230 00	
Lumber .....	1,738 32	
Lath .....	444 30	
Shingles and shakes .....	157 41	
Charcoal and coal .....	64 62	
Drayage and livery .....	58 50	
Freight .....	924 79	
Telegraphing .....	9 00	
Wooden buildings .....	800 00	
A. A. Cook, architect .....	412 00	
Interest .....	481 64	
Vault front .....	275 00	
Less sales of material .....	\$25,390 25	
	425 91	
Balance remaining of fund .....	\$24,964 34	
	15,035 66	
Totals .....	\$40,000 00	\$40,000 00

TABLE FIVE.

*Cost of Prison Building to November 1, 1880.*

Source.	Amount.
Amount from former Board of Directors .....	\$275,000 00
Amount Folsom Branch Prison Fund .....	9,145 32
Amount present Construction Fund .....	24,964 34
Total .....	\$309,109 66

TABLE SIX.

*Maintaining Cost State Prison at Folsom, August 1 to October 31, 1880.*

1880.	July and August.	September.	October.	Totals.
Subsistence .....	\$885 15	\$945 02	\$1,153 22	\$2,983 39
Subsistence "commutation" .....	52 55	70 00	150 00	272 55
Forage .....	124 23	23 55	73 84	221 62
Clothing .....	58 65	251 20	130 78	440 63
Shoes .....	22 00	94 67	42 44	159 11
Bedding .....	651 02	403 10	690 21	1,744 33
Light .....	201 01	48	5 67	207 16
Medicines .....	363 98	1 48	123 52	488 98
Postage .....	7 62	19 22	-----	26 84
Stationery .....	33 01	2 01	8 97	43 99
Fuel .....	287 25	74 75	120 61	482 61
Freight .....	36 57	247 47	81 50	365 54
General use .....	362 43	198 61	210 57	771 61
Expense .....	76 40	37 85	25 50	139 75
Salary .....	2,482 30	2,067 35	2,115 74	6,665 39
Transportation of prisoners from San Quentin .....	271 95	359 35	134 40	765 70
Discharged prisoners .....	-----	-----	6 00	6 00
Totals .....	\$5,916 12	\$4,796 11	\$5,072 97	-----
Total maintaining cost for three months .....	-----	-----	-----	\$15,785 20

TABLE SIX—Continued.

	No. of Prisoners.	Cost per Man per Day.	Average Cost per Man per Day.
July, 5 days; August, 31 days—36 days, 44 men; 8 days, 97 men .....	97	1.69	1.17
September—30 days, 97 men; 24 days, 153 men; 1 day, 208 men .....	208	1.04	
October—31 days, 209 men .....	209	.78	

TABLE SEVEN.

*Expenditures other than Maintaining Cost.*

1880.	July and August.	September.	October.	Totals.
Wagons and harness .....	\$25 00	\$55 00	-----	\$80 00
Furniture, crockery, etc. ....	2,600 43	1,251 82	\$311 22	4,164 47
Tools .....	258 79	124 24	300 61	683 64
Ordnance .....	727 30	1,128 65	145 50	2,001 45
Wooden building .....	150 00	-----	-----	150 00
Building fund .....	81 70	104 82	503 66	690 18
Telephone line .....	-----	-----	350 00	350 00
Machinery .....	-----	-----	2,075 45	2,075 45
Pipes and fittings .....	-----	-----	1,702 04	1,702 04
Live stock .....	-----	-----	135 00	135 00
Interest .....	-----	250 76	228 86	479 62
Totals .....	\$3,843 22	\$2,916 29	\$5,752 34	-----
Total for three months .....	-----	-----	-----	\$12,511 85



TABLE EIGHT.

*Aggregate Expenditures.*

1880.	July and August.	September.	October.	Totals.
Maintaining cost .....	\$5,916 12	\$4,796 11	\$5,072 97	\$15,785 20
Other than maintaining cost.....	3,843 22	2,916 29	5,752 34	12,511 85
Totals .....	\$9,759 34	\$7,712 40	\$10,825 31	
Total expenditures for three months.....				\$28,297 05

TABLE NINE.

*Financial Statement, October 31.*

	Amounts.	Totals.
<i>Assets.</i>		
Prison building.....	\$284,145 32	
Derricks and fixtures.....	4,305 00	
Telephone line.....	350 00	
Machinery.....	5,185 02	
Pipes and fittings.....	1,803 15	
Real estate.....	15,000 00	
Railroad material.....	509 81	
Merchandise, iron, and steel.....	223 69	
Merchandise in Commissary Department.....	4,248 03	
Cash.....	2,046 85	
Furniture, crockery, etc.....	4,194 47	
Tools.....	2,336 60	
Ordnance.....	2,001 45	
Wooden buildings.....	979 54	
Live stock.....	510 00	
Wagons and harness.....	90 00	
Due by sundry debtors.....	239 15	
<i>Liabilities.</i>		\$328,168 08
Owe for merchandise.....	\$5,718 38	
Owe for salaries.....	2,069 19	
Owe for real estate.....	15,000 00	
		22,787 50
Excess of assets.....		\$305,380 57

TABLE TEN.

*Cash Statement to October 31, 1880.*

Source and Purpose.	Received.	Paid out.
Received of State Treasury, account Branch Prison Fund .....	\$9,145 32	
Received of State Treasury, account Construction Fund .....	28,878 59	
Received of State Treasury, account General Appropriation .....	20,948 00	
Received of W. A. Brown, salary not drawn .....	1 60	
Received of A. Brownell, account Construction Fund .....	29 70	
Received for sales, account Construction Fund .....	353 07	
Received for sales, account Commissary .....	290 67	
Received for sales, account clothing .....	1 75	
Received for sales, account shoes .....	4 75	
Received for sales, account tools .....	8 00	
Received for labor .....	1 25	
Total .....	\$59,662 70	
Paid for labor and material, account Branch Prison Fund .....		\$9,145 32
Paid for merchandise, account Commissary .....		15,096 47
Paid for merchandise, account construction .....		13,458 92
Paid for labor, account construction .....		9,725 88
Paid for salaries, as per payrolls .....		4,473 55
Paid for salaries, extra service .....		134 25
Paid A. A. Cook, architect .....		334 00
Paid for Union gas machine .....		1,612 50
Paid for interest .....		961 26
Paid for commutation subsistence .....		122 55
Paid for freight .....		953 85
Paid for transportation of prisoners from San Quentin .....		631 30
Paid for wooden buildings .....		950 00
Paid for expense .....		10 00
Paid to discharged prisoners .....		6 00
Total .....		\$57,615 85
Cash on hand .....		2,046 85
	\$59,662 70	\$59,662 70

TABLE ELEVEN.

*Official Force State Prison at Folsom.*

Names.	Position.	Salary.
<i>Officers.</i>		
T. C. Pockman .....	Warden .....	\$200 00
J. M. Miner .....	Clerk and Acting Commissary .....	125 00
<i>Appointees.</i>		
W. A. Grover .....	Surgeon .....	100 00
B. Chambers .....	Captain of Guard and Acting Captain of Yard .....	150 00
A. Brownell .....	Gatekeeper .....	60 00
T. J. Adams .....	Engineer .....	80 00
J. G. Brodie .....	Captain First Watch .....	70 00
P. F. Dolan .....	Captain Second Watch .....	70 00
Charles Finley .....	In charge of stables .....	50 00
George K. Hendel .....	First Steward .....	60 00
H. Schlingheyde .....	Second Steward .....	60 00
Twenty-one men as .....	Guards .....	50 00

## COMMISSARY DETAILS.

TABLE ONE.

1880.	MAINTAINING COST—EXPENSE PER MAN PER DAY.	
	No. of Prisoners.	Cost per day per Prisoner.
July, 5 days, } 36 days, 44 men; 8 days, 97 men-----	97	.88
August, 31 days, }		
September, 30 days, 97 men; 24 days, 153 men; 1 day, 208 men -----	208	.47
October, 31 days, 209 men -----	209	.41
Average cost per day per man -----		.58.6

TABLE II.  
*Items of Maintaining Cost.*

1880.	Subsistence	Forage	Clothing	Shoes	Bedding	Light	Medicines	Postage	Stationery	Fuel	Freight	General Use	Expense	Totals
July and August	\$285 15	\$124 23	\$58 65	\$22 00	\$651 02	\$201 01	\$363 98	\$7 62	\$33 01	\$287 25		\$362 43	\$76 40	\$3,072 75
September	945 02	255 55	252 70	99 42	403 10	48	1 48	19 22	2 01	74 75	\$114 90	198 61	37 85	2,173 09
October	1,153 22	73 84	154 28	45 44	690 21	5 67	123 52		8 97	120 61	81 50	214 07	15 50	2,666 83
Totals	\$2,983 39	\$221 62	\$445 63	\$166 86	\$1,744 33	\$207 16	\$488 98	\$26 84	\$43 99	\$482 61	\$186 40	\$775 11	\$129 75	\$7,912 67

TABLE III.  
*Items of Property Issued, and Sales.*

1880.	Machinery	Pipes and Fittings	Live Stock	Building Fund	Crockery, Furniture, etc.	Tools	Ordnance	Wagons and Harness	Wooden Buildings	Total Property Issued	Cash Sales	Sales to Employes	Total Sales
July and August				\$81 70	\$2,600 43	\$258 79	\$727 30	\$25 00	\$150 00	\$3,843 22	\$10 85	\$9 70	\$20 55
September				104 82	1,232 82	124 24	1,128 65	55 00		2,665 53	35 80	104 37	140 17
October	\$46 13	\$392 91	\$135 00	281 77	302 72	141 30	145 50			1,455 33	75 44	202 22	277 66
Totals	\$46 13	\$392 91	\$135 00	\$478 29	\$4,155 97	\$524 33	\$2,001 45	\$80 00	\$150 00	\$7,964 08	\$122 09	\$316 29	\$438 38

TABLE IV.

*Aggregated Statement of Maintaining Cost, Property Issued, and Sales.*

1880.	July and August.	September.	October.	Totals.
Maintaining cost-----	\$3,072 75	\$2,173 09	\$2,666 83	\$7,912 67
Property issued-----	3,843 22	2,665 53	1,455 33	7,964 08
Sales-----	20 55	140 17	277 66	438 38
Totals-----	\$6,936 52	\$4,978 79	\$4,399 82	
Total issues, Commissary Department, for three months-----				\$16,315 13

## PRISON STATISTICS.

TABLE ONE.

*Nativity of Prisoners.*

Nativity.	Number.	Nativity.	Number.
Arkansas-----	1	Austria-----	2
California-----	25	British Columbia-----	1
Connecticut-----	4	Canada-----	2
Delaware-----	1	Denmark-----	1
Illinois-----	5	England-----	10
Indiana-----	2	France-----	1
Kentucky-----	3	Germany-----	6
Louisiana-----	2	Holland-----	1
Maine-----	1	Italy-----	2
Michigan-----	1	Ireland-----	22
Missouri-----	5	Mexico-----	3
Massachusetts-----	9	Newfoundland-----	1
Maryland-----	4	Poland-----	1
New Jersey-----	4	Prussia-----	2
New York-----	32	Scotland-----	3
Ohio-----	7	Wales-----	1
Oregon-----	2	China-----	21
Pennsylvania-----	12		
Rhode Island-----	1	Total foreign born-----	80
Tennessee-----	1		
Texas-----	2	Natives of the United States-----	129
Virginia-----	3	Foreigners-----	80
Wisconsin-----	1		
Washington Territory-----	1	Total-----	209
Total native born-----	129		

TABLE TWO.

*Occupations.*

Occupation.	Number.	Occupation.	Number.
Blacksmith .....	2	Marble cutter .....	1
Barber .....	3	Mechanic .....	1
Boilermaker .....	1	Painter .....	8
Bookkeeper .....	1	Printer .....	3
Bricklayer .....	1	Peddler .....	1
Butcher .....	1	Stone mason .....	3
Baker .....	4	School teacher .....	1
Cooper .....	1	Sawyer .....	1
Cook .....	10	Shoemaker .....	7
Carpenter .....	3	Sailor .....	9
Clerk .....	7	Tailor .....	3
Chair-bottomer .....	1	Telegraph operator .....	1
Engineer .....	4	Teamster .....	10
Fireman .....	3	Tinsmith .....	2
Farmer .....	4	Vacquero .....	2
Gardener .....	1	Upholsterer .....	1
Gasfitter .....	1	Washman .....	7
Herder .....	1	Wheelwright .....	1
Hostler .....	5	Waiter .....	8
Lithographer .....	1	Whipmaker .....	1
Lawyer .....	1		
Laborer .....	74	Total .....	209
Miner .....	8		

TABLE THREE.

*Counties Sent From.*

County.	Number.	County.	Number.
Alameda .....	10	San Joaquin .....	16
Amador .....	1	Sacramento .....	14
Butte .....	3	Stanislaus .....	6
Contra Costa .....	4	Santa Clara .....	3
Colusa .....	6	San Benito .....	1
Calaveras .....	1	Solano .....	3
Fresno .....	3	Santa Barbara .....	1
Inyo .....	1	Santa Cruz .....	1
Kern .....	7	Shasta .....	3
Lassen .....	1	San Luis Obispo .....	1
Los Angeles .....	2	Sutter .....	2
Marin .....	4	San Bernardino .....	1
Merced .....	4	Sierra .....	1
Mendocino .....	3	Tehama .....	2
Monterey .....	3	Tulare .....	3
Nevada .....	2	Ventura .....	1
Placer .....	8	Yuba .....	5
Plumas .....	1	Yolo .....	7
San Francisco .....	67		
Sonoma .....	8	Total .....	209

TABLE FOUR.

*Ages of Prisoners.*

Age.	Number.	Age.	Number.
Sixteen years .....	1	Thirty-seven years .....	4
Seventeen years .....	5	Thirty-eight years .....	1
Eighteen years .....	9	Thirty-nine years .....	3
Nineteen years .....	4	Forty years .....	7
Twenty years .....	6	Forty-one years .....	3
Twenty-one years .....	13	Forty-two years .....	6
Twenty-two years .....	11	Forty-three years .....	2
Twenty-three years .....	6	Forty-four years .....	1
Twenty-four years .....	8	Forty-five years .....	3
Twenty-five years .....	15	Forty-six years .....	3
Twenty-six years .....	14	Forty-seven years .....	2
Twenty-seven years .....	8	Fifty years .....	1
Twenty-eight years .....	11	Fifty-one years .....	2
Twenty-nine years .....	7	Fifty-two years .....	2
Thirty years .....	8	Fifty-three years .....	1
Thirty-one years .....	5	Fifty-four years .....	2
Thirty-two years .....	3	Fifty-five years .....	1
Thirty-three years .....	7	Fifty-six years .....	1
Thirty-four years .....	8	Total .....	209
Thirty-five years .....	11		
Thirty-six years .....	4		

TABLE FIVE.

*Crimes.*

Crimes.	Number.
Assault with deadly weapon .....	5
Assault to rob .....	6
Assault to murder .....	7
Assault to rape .....	3
Assault to do bodily injury .....	2
Attempt to commit burglary—first degree .....	1
Attempt to commit burglary—second degree .....	2
Attempt crime against nature .....	1
Burglary—first degree .....	26
Burglary—second degree .....	37
Burglary .....	14
Burglary and grand larceny .....	1
Grand larceny .....	39
Forgery .....	6
Embezzlement .....	2
Felony .....	6
Murder—first degree .....	2
Murder—second degree .....	7
Manslaughter .....	8
Perjury .....	1
Robbery .....	33
Total .....	209

TABLE SIX.

*Terms of Imprisonment.*

Term.	Number.	Term.	Number.
Life.....	2	Ten years.....	21
One year.....	13	Eleven years.....	5
One year and three months.....	1	Twelve years.....	3
One year and six months.....	8	Twelve years and three months.....	1
Two years.....	25	Thirteen years.....	1
Two years and six months.....	4	Fourteen years.....	3
Three years.....	16	Fifteen years.....	11
Three years and six months.....	2	Seventeen years.....	1
Three years and eight months.....	1	Twenty-one years.....	1
Four years.....	23	Twenty-two years.....	1
Four years and five months.....	1	Twenty-five years.....	2
Five years.....	29	Twenty-seven years and six months.....	1
Six years.....	14	Twenty-eight years.....	1
Seven years.....	12	Thirty-four years.....	1
Eight years.....	4		
Nine years.....	1	Total.....	209

TABLE SEVEN.

*Number of Terms.*

Term.	Number.	At San Quentin.	At Folsom.
First term.....	132		1
Second term.....	49	1	1
Third term.....	15	2	1
Fourth term.....	5	3	1
Fifth term.....	4	4	1
Sixth term.....	4	5	1
Totals.....	209		

TABLE EIGHT.

*Educational Abilities of Prisoners.*

Read and write.....	167
Neither read nor write.....	24
Read, but not write.....	18
Total.....	209



TABLE NINE.

*Credits Allowed Prisoners for Good Conduct.*

Sentence.	Years.	Months.
One year.....		2
Two years.....		4
Three years.....		8
Four years.....	1	0
Five years.....	1	5
Six years.....	1	10
Seven years.....	2	3
Eight years.....	2	8
Nine years.....	3	1
Ten years.....	3	6
Eleven years.....	3	11
Twelve years.....	4	4
Thirteen years.....	4	9
Fourteen years.....	5	2
Fifteen years.....	5	7
Sixteen years.....	6	0
Seventeen years.....	6	5
Eighteen years.....	6	10
Nineteen years.....	7	3
Twenty years.....	7	8
Twenty-five years.....	9	9
Thirty years.....	11	10

Fractions of years in pro rata.

TABLE TEN.

*Receipts and Discharges of Prisoners.*

Items.	Number.	Total.
Received from San Quentin, July 26th.....	44	
Received from San Quentin, August 23d.....	52	
Received from San Quentin, September 6th.....	52	
Received from San Quentin, September 30th.....	52	
Received by cominital.....	11	
Total received.....		211
Discharged by pardon.....	1	
Escaped.....	1	
Total discharged.....		2
On hand October 31st, 1880.....		209



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Report of Physician of the State Prison at Folsom.

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## REPORT OF PHYSICIAN.

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*To Honorable T. C. Pockman, Warden :*

DEAR SIR: I hereby submit for your consideration my quarterly report of the medical department of the State Prison at Folsom; and in doing so, I beg leave to state that, owing to the many unavoidable inconveniences incident to the commencement of a new enterprise, and the limited amount of time at my command, I shall be able to give only a general outline of the department for the quarter ending October 31st, 1880, and respectfully refer you to the tabulated statement presented herewith.

I commenced my labors here on the twenty-ninth day of July last. There were then in the prison 44 prisoners, and during the months of August, September, and October, 156 more were transferred from San Quentin, and 10 have been committed, making a total of 210.

Of this number, two were suffering from chronic bronchitis and disease of the lungs, and have been the subjects of daily and constant care. One of them has greatly improved since he came here, while the other has gradually failed. From daily observation and a close examination of those who have applied to me for medical treatment, I find that over thirty per cent. of the whole number are suffering from some chronic or organic disease, which, together with long confinement and vicious habits, have so enfeebled them that they are unable to perform any laborious work, and are the subjects of constant and daily medical treatment. I am happy, however, to say that most of this class, under the kind treatment of the Warden, and other officers of the prison, are not only willing but trying to do the best they can, and much prefer occupation in the warm sun and the open air to confinement in the solitary cell or dreary jail yard.

It would be impossible, in the brief space of time which I have at my command, to enumerate and classify all of the various diseases which I have been called upon to treat since I came here. Sufficient to say that the prescriptions and calls have averaged about twenty-five per day. Among the most prominent of the complaints, I will mention only a few of those which have given me the most anxiety and trouble.

We have been afflicted, from the beginning to the present time, with a bilious colic, usually ushered in by chills, severe griping pains in the stomach and small intestines, acidity of the stomach, nausea and vomiting, and terminating in a profuse and troublesome diarrhea. These cases usually last from 48 hours to several days, and in some instances for several weeks, and have been exceedingly troublesome to both patient and physician. I have not as yet been able to ascertain satisfactorily to myself the cause of this difficulty. I shall

endeavor, however, at an early day, to ascertain if possible the cause, and hope to be able to suggest a remedy.

Seminal weakness is another serious disease which afflicts a large number of those sent here, and though it may be overlooked by a casual observer, yet it is, nevertheless, a formidable disease when encountered in any considerable numbers. It is usually brought on by self-abuse and other vicious habits incident to prison life, during long and continued confinement. It causes a long line of unpleasant symptoms, such as palpitation of the heart, nervous excitement, pain in the back and loins, nightly emissions, and general debility. Such persons are far from being strong and efficient laborers; whether they can ever be permanently cured or not, they must have treatment, and will be the constant visitors at the office and dispensary.

Although the prisoners were transferred to this place during the most sickly season of the year (August and September), yet I am happy to state that most of them have greatly improved in health, strength, and spirits since they came here; and as I have the opportunity of conversing with them from day to day, I find that most of them prefer this place to the one from which they came. In regard to the climate of Folsom, and its effect upon the prisoners, I was, at first, greatly in doubt; but I am pleased to say that thus far it has been favorable rather than otherwise, and many of those who were unaccustomed to hard labor, and more or less enfeebled by long confinement and chronic diseases, have here been daily employed in open air, and if they have not entirely recovered, have been greatly benefited thereby.

It is true that many of the officers, guards, and other employés of the prison have been more or less afflicted by what is commonly called the "Folsom fever," but from my short experience of three months of the most sickly part of the year, I am inclined to believe it is not of a malarious origin, but rather of a bilious character; and though it is sometimes ushered in by somewhat severe symptoms, yet with prompt and active treatment, it lasts but a few days.

The cases which have occurred among the prisoners have generally been light, and have usually lasted from three to six days. I cannot, therefore, regard it as either difficult to treat, formidable in character, or dangerous to the best interests of the institution. And in the process of time, when this prison shall be finished and supplied with all the appliances of other similar institutions, this disease may cause its inmates less trouble than any other with which we shall have to contend.

Following is the tabulated statement of the prevalent diseases at this prison during the quarter ending October 31, 1880:

Disease.	Number.	Disease.	Number.
Abscess in superior maxillary bone	1	Inflammation of ear	5
Aneurism	2	Inflammation of eye	4
Asthma	3	Insomnia	5
Bronchial consumption	1	Lumbago	7
Bronchitis	28	Meningitis	1
Catarrh	11	Nervous derangement	2
Contusions, sprains, and wounds	37	Neuralgia	4
Diarrhea	80	Paralysis	4
Diseases of brain	5	Partial insanity	2
Disease of kidneys	5	Pleuritis	3
Disease of heart	6	Poison oak	7
Disease of scalp	1	Polypus, nasal	1
Dysentery	1	Rheumatism	4
Dyspepsia	4	Sciatica	3
Fever and ague	60	Secondary syphilis	1
Gleet	1	Seminal weakness	10
Hemorrhoids	5	Stricture	2
Hernia	6	Tonsilitis	2
Indolent ulcer	4	* Unclassified diseases	610

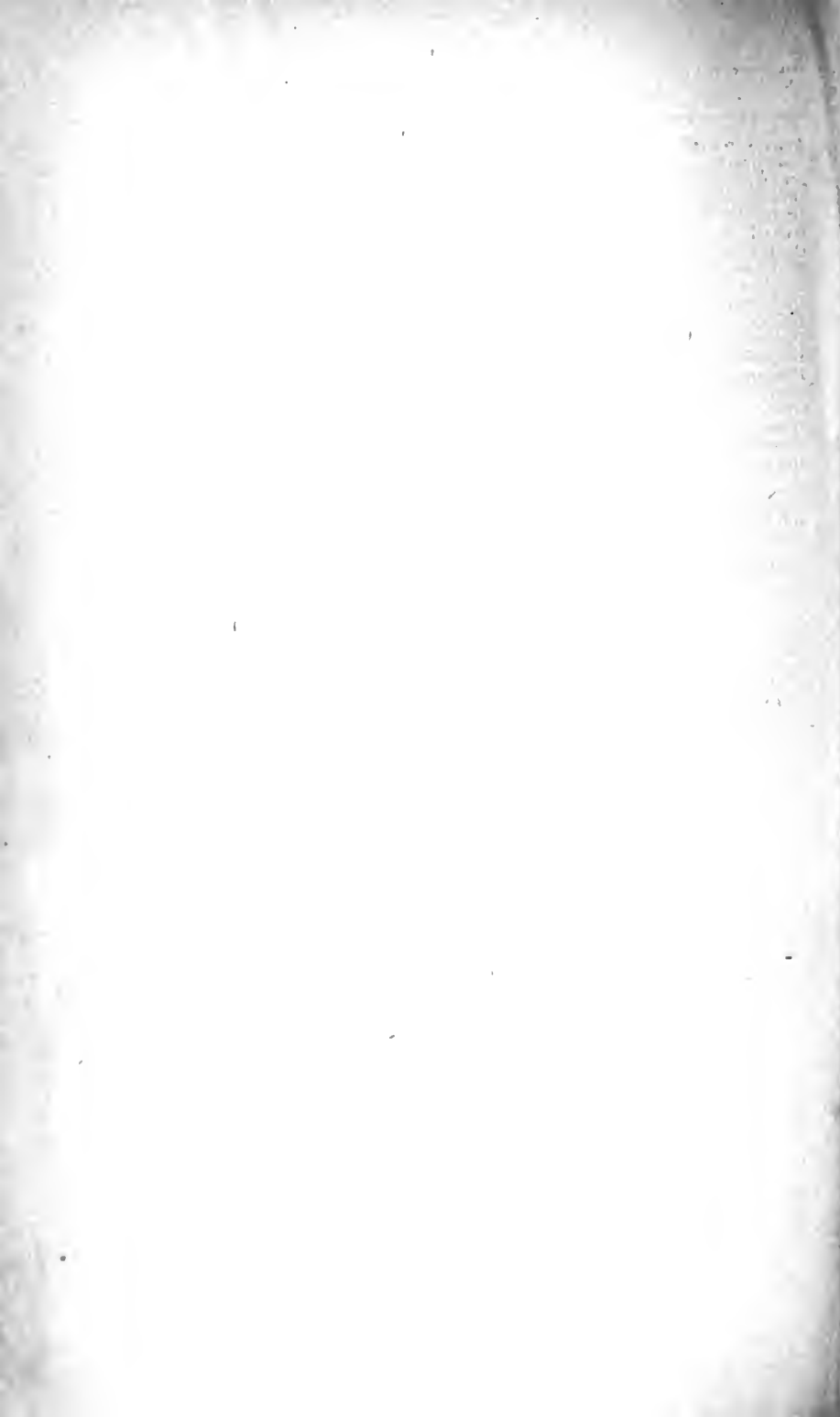
\* Unclassified diseases include all such cases as require a prescription and medicine, which is usually taken at the office or dispensary, and do not usually require any further treatment.

All of which is most respectfully submitted.

W. A. GROVER, M. D.,

Surgeon and Physician of the State Prison at Folsom.

October 31, 1880.





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ANNUAL REPORT

OF THE

STATE MINERALOGIST,

FROM

June 1, 1880, to December 1, 1880.

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# REPORT.

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*To his Excellency* GEORGE C. PERKINS, *Governor of California* :

SIR: I have the honor to submit to you a report of progress made by the California State Mining Bureau since its organization.

The Mining Bureau bill provides for an annual report, showing not only the amount of the disbursements of the Bureau, number of specimens collected, etc., but giving also "such statistical information in reference to mines and mining as shall be deemed important."

There has been some doubt in my mind as to whether this provision referred to the civil year, or to the termination of the official year. Owing to this doubt, I have thought best to present this report of progress, although only six months have passed, and to reserve for future publication, manuscript prepared for a more extended report.

SAN FRANCISCO, CAL., December 1st, 1880.

HENRY G. HANKS,  
State Mineralogist.

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## REPORT OF PROGRESS—HISTORY.

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The California State Mining Bureau is the creation of the twenty-third Legislature of the State of California. The bill—which is given in full below—originated in the Assembly. It was introduced by Honorable Joseph Wasson, representing the counties of Mono and Inyo:

### AN ACT

TO PROVIDE FOR THE ESTABLISHMENT AND MAINTENANCE OF A MINING BUREAU.

[Approved April 16, 1880.]

*The People of the State of California, represented in Senate and Assembly, do enact as follows:*

SECTION 1. There shall be and is hereby established in this State, a Mining Bureau, the principal office of which shall be maintained in the City of San Francisco, at which place there shall be collected by the State Mineralogist, and preserved for study and reference, specimens of all the geological and mineralogical substances, including mineral waters, found in this State, especially those possessing economic or commercial value, which specimens shall be marked, arranged, classified, and described, and a record thereof preserved, showing the character thereof, and the place from whence obtained. The State Mineralogist shall also, as he has opportunity and means, collect, and in like manner preserve at said office, minerals, rocks, and fossils of other States, Territories, and countries, and the collections so made shall at all reasonable hours be open to public inspection, examination, and study.

SEC. 2. It shall be the duty of the Governor to appoint a citizen of this State having a practical and scientific knowledge of mining and mineralogy, to the office of State Mineralogist, to hold his said office for the term of four years, or until the appointment and qualification of his successor, who shall take and subscribe the oath of office prescribed by the Constitution, and who shall receive for his services a salary of three thousand dollars per annum, to be paid as other officers of the State are paid, and shall also receive his necessary traveling expenses, when traveling on the business of his office, to be allowed and audited by the State Board of Examiners, the whole to be paid out of the Mining Bureau Fund hereinafter provided for, and not otherwise.

SEC. 3. In addition to the collection, classification, arranging, and preservation of specimens, as provided in the first section of this Act, it shall be the duty of the State Mineralogist to make analytical assays as required; and when the funds in the Mining Bureau Fund are sufficient therefor, to provide and maintain a library of works on mineralogy, geology, and mining; to arrange in cases such specimens as he may collect; to procure and preserve models and drawings of mining machinery, and of milling machinery used in the reduction of ores; to correspond with established schools of mining and metallurgy, and obtain and preserve for public inspection and use, such information respecting improvements in mining and mining machinery as will be of practical value to the people of this State; to visit the several mining districts of each county of the State, from time to time, ascertain and record their history, describe their geological formation and altitudes, the character of the mines and ores, and the general development of the district. At the close of each year he shall make a report in detail to the Governor, showing the amount of disbursements of the Bureau under his charge, the number of specimens collected, and giving such statistical information in reference to mines and mining as shall be deemed important.

SEC. 4. The State Mineralogist may, from time to time, and as the funds in the Mining Bureau Fund will permit, appoint such assistants as he may deem necessary and proper for the carrying out of the objects of this Act, and the efficient provision and maintenance of a Bureau of mining information and statistics, and may procure and maintain the necessary rooms and furniture for the office and uses of the Bureau in San Francisco; but the entire expenses of the Bureau for salaries, assistance, rents, furniture, fuel, and all other things pertaining to the Bureau, must not, in any one year, be greater than can be paid out of the Mining Bureau Fund herein provided for.

SEC. 5. For the purpose of establishing a fund for the maintenance of said Mining Bureau, it shall be the duty of the Tax Collectors in the several counties in this State, and of the License Collector of the City and County of San Francisco, on the second Monday in January, April, July, and October, in each year, to transmit by express to the State Treasurer all moneys collected by them from mining corporations, or from corporations formed for milling ores, or for supplying water for mining purposes, under or by virtue of the Act entitled "An Act imposing a tax on the issue of certificates of stock corporations," approved April first, eighteen hundred and seventy-eight, and to forward to the State Controller by mail a certificate showing the amount of money so forwarded to the State Treasurer, and the date when the same was transmitted, and also showing the names of the several corporations from which the same was received, and the amount received from each. The State Treasurer shall receive the amounts so transmitted, and give duplicate receipts therefor, one of which shall be filed with the State Controller, and the other shall be returned by mail, or return express, to the Collector from whom the money was received; and after paying out of the money so received the charges for the transmission thereof, the amount of which shall be noted on the receipt filed with the State Controller, he shall retain the remainder in his hands as a separate fund, to be known as the Mining Bureau Fund, to be used only in payment of drafts made for the expenses of the Mining Bureau established under this Act, and out of which all the expenses of said Bureau shall be paid.

SEC. 6. Such Tax Collectors and License Collector shall hereafter be required to pay into the county treasuries of their respective counties only that portion of the moneys collected by them under the Act of the Legislature mentioned in the last preceding section, which is collected from corporations other than those mentioned in section five of this Act.

SEC. 7. This Act shall take effect and be in force from and after its passage.

The present State Mineralogist was appointed by the Governor in May following the passage of the bill, his commission bearing the date of May fifteenth, eighteen hundred and eighty. The first step taken toward the establishment of the Bureau was the temporary occupation of a small room, in the building number six hundred and nineteen Montgomery street. It was found difficult to obtain rooms suitable for the use of the Bureau. After examining many, a suite was finally selected which, although falling far below the requirements of a Museum worthy of the great State of California, is perhaps the best available at the present time for the purpose. The rooms at present occupied by the Bureau are on Pine street, number three hundred and thirteen, south side, between Sansome and Montgomery. They consist of a large main hall, lighted from above by a skylight, a spacious office and reception room for the State Mineralogist, an adjoining room, containing the nucleus of the reference library, a large storeroom, and one serving the double purpose of a chemical laboratory and for the preparation of specimens for the Museum. As it is expressly understood that the building is soon to

be torn down and rebuilt, the occupation is considered as temporary, and no cases or other fixtures have been or will be constructed which cannot be readily removed.

Immediately on taking possession of the Pine street rooms, the following circular was prepared and extensively distributed, not only in California but also in the adjoining States and Territories. Another, setting forth briefly the objects and plans of the State Mining Bureau, and containing the full text of the bill, was sent to scientific institutions and individuals, both in the United States and in foreign countries:

CALIFORNIA STATE MINING BUREAU.  
OFFICE OF STATE MINERALOGIST, SAN FRANCISCO. }

DEAR SIR: By an Act of the Twenty-third Legislature there has been established in the City of San Francisco a State Mining Bureau, and a State Mineralogist appointed by the Governor, authorized to carry out the provisions of the law. As it is an institution new to the people, this circular is prepared to set forth the objects and aims of the Bureau, and at the same time to request the cooperation of all who are interested in the development of the mining interests of the State. The law would on first thought seem exclusive, yet its scope is liberal as to the mining interests of "other States, Territories, and countries," as the tax for the support of the institution comes from the stock of companies operating in the world at large, but who have their transfer and chief offices in the mining metropolis and cosmopolitan city of California. It is proposed to make the State Bureau of Mining a depository of useful and interesting information in every department.

Heretofore, mining in California, and throughout the country generally, has been chiefly confined to the precious metals, while the State and coast at large are rich in many other minerals possessing great economic value in connection with the arts and manufactures. Now that railroads are being built which offer increased facilities for transportation, the utilization of mineral substances hitherto considered worthless, is no longer a problem. Old mines and mining districts that were abandoned because inaccessible, and for want of cheap and rapid transportation, are again attracting attention. As speedily as possible everything bearing on these subjects in the way of practical and reliable information will be gathered into the State Bureau, to which the public will have free access at reasonable hours during every legal day of the year.

The State Mineralogist is empowered to employ scientific and practical assistants, as the funds will permit, to operate in the field, and there will be new and interesting matter constantly added, such as maps, statistics, reports, surveys, etc., besides a collection of all the ores, minerals, fossils, rocks, metallurgical products, building stones, etc., of the Pacific Coast, with models of mining machinery in use and newly invented, and a general collection of ores and minerals of other countries for reference. It is intended to include everything that pertains to practical and legitimate mining.

The Bureau will constitute an historical repository, and all maps, reports, volumes of newspapers, copies of district laws and records, however old and seemingly out of date, will be sought for and preserved; many, if not all such documents, will be found to possess value outside of their rarity, involving as they may, questions of title to valuable property, neglected or idle. The Museum of Practical Geology will be made a special feature of the Bureau, and all contributions will be duly accredited, displayed, and preserved. A feature of leading interest will be the procuring and exhibiting of models of mining machinery: all that is interesting, whether old or new, will be carefully preserved and shown. Inventors are specially requested to exhibit models in the rooms of the Bureau, which will also include a reading-room, where the press will be represented, and a reference library of works on mineralogy, geology, metallurgy, and kindred subjects will be collected. The State Mineralogist has secured for an indefinite period the central, commodious, and well appointed rooms formerly occupied by the San Francisco Art Association, No. 313 Pine street, near Sansome, which he will occupy on the first of June. Satisfactory arrangements with the principal transportation and express companies have been made, whereby persons contributing articles of value and interest can forward such without expense to themselves.

The law requires that all mineral waters or springs throughout the State be examined, their value and characteristics ascertained, and the information duly published. This will materially increase the interest of the world at large in California as a health resort.

It is desired to make the ethnology of the Pacific Coast a feature of the Museum. All Indian relics, recent or prehistoric, will find a place, and their collection will no doubt throw much light on the ancient history of the State. It is the intention of the Bureau to make, sooner or later, a thorough industrial survey of the State. As every county is, to a certain extent, a mining county, all should be represented, and the prominent men of each are requested to see that the State Museum is provided with a full representation of the mineral resources of the county in which they reside. As every article of value sent to the Bureau will become the property of the State for the use and benefit of the public, and will be carefully preserved in the State Museum, and as it is desirable to make it as instructive and attractive as may be, donations of other articles of interest, such as views, pictures, paintings, curiosities, and works of art—in short, anything which would add to the general interest of the Bureau and tend to

make the Museum a popular resort for information and study, are solicited. The Bureau commences with a large and valuable donation of ores, rocks, fossils, reports, books, etc., the entire collection and property of the State Geological Society. Miners and prospectors are requested, when new finds are made, for better determination as to value and character, to always accompany ores with samples of the wall and country rocks, with written descriptions of the same. It is desirable that every mine in the State and adjoining States and Territories, which has a name, should be represented in the Bureau.

When anything occurs in the workings of the Bureau that is of special or immediate interest, it will be given to the public through the medium of the press. Annual reports to the Governor will be printed for general distribution. These reports should be valuable for permanent reference.

The California State Geological Society was organized in January, eighteen hundred and seventy-seven, and incorporated under the laws of the State.

The following is an extract from the By-Laws of the Society :

#### ARTICLE I—NAME.

The Society shall be known as the "California State Geological Society."

#### ARTICLE II—OBJECTS.

The objects of the Society are:

1. To make a Pacific Coast geological collection, to be offered to the State of California gratis, upon such terms and conditions as the Society may determine, and as may be agreed upon.
2. To encourage the study of geology in all its branches.

#### ARTICLE III—CONDITIONS.

Among the conditions which shall be required by the Society before such collection mentioned in the preceding article shall be presented to the State of California, are the following: The State of California shall provide suitable rooms where the collection may be kept, and shall provide cases to contain the same.

The collection shall remain in the City and County of San Francisco, and shall not be removed therefrom.

It shall always be open to the inspection of the public free of charge, during seasonable hours.

It becoming possible for the State to accept the collection upon these terms by the institution of the State Museum, the whole property, including the collection aforesaid and the valuable library, were turned over to the State by the Society.

The collection embraces one thousand three hundred and twenty-seven specimens from all parts of the Pacific Coast; many of them are of special value. The library numbers seventy-eight volumes and twenty-five pamphlets, including testimony, arguments, and decisions in the case of the Eureka Consolidated Mining Company vs. Richmond Mining Company, of Nevada, a large volume, of which there were but twelve copies published. The identical specimens used in Court in this important suit are included in the mineral collection, and have been placed in a separate case for ready reference.

The collection represents a large amount of labor and money expended in acquisition and preparation of the specimens. The donation is therefore very valuable, and it is to be hoped will be followed by others. The Geological Society retains its organization, but all specimens, publications, and other collections made in the future will revert to the State Museum.

The mineral interests of the State were represented at the Paris Exposition of eighteen hundred and seventy-eight. The collections attracted much attention, and won for the State a gold medal. The greater portion was donated to the French Government, in the name

of the State of California, and is now in the Museum of the Ecole des Mines, in Paris. The specimens returned to the State after the Exposition naturally came into the possession of the Bureau.

Both collections above referred to were delivered to the Mining Bureau packed in boxes. Although partly arranged, it required considerable labor to prepare them for the new Museum. This work was immediately commenced by the State Mineralogist and Lewis G. Larsen, who had been appointed Janitor. The names of the specimens, with localities numbered consecutively, were sent to the printer and returned in printed sheets, to be used as labels and to form a rough catalogue. To facilitate the work, and to make a showing in the Museum, ten glass showcases were hired for temporary use, and a contract was made with William Proll & Co., of San Francisco, to furnish forty plate glass cases and tables of uniform size and finish.

These cases are eight feet long by two feet wide, and ten inches deep; the woodwork is of black walnut. Each table is on castors, which admits of its being moved without disturbing the specimens. The collections already arranged fill all the show-cases in the main hall. This does not include the large number of specimens which have also accumulated, but which cannot be placed on exhibition until more cases are provided.

The following is a showing of the contents of the cases:

- Four cases California minerals.
- Two cases California gold ores.
- One case California silver ores.
- One case California lead ores and products of lead manufacture.
- One case California quicksilver ores.
- One case California chromic iron and products.
- One case California fossils.
- Five cases California rocks.
- One case California copper ores and products.
- Two cases Nevada minerals.
- One case Nevada rocks.
- One case Nevada ores.
- One case Nevada ores, Comstock mines.
- One case Nevada ores, illustrating suit between Eureka Con. and Richmond.
- One case Oregon and Washington Territory ores, minerals, and fossils.
- Two cases Arizona ores and minerals.
- Two cases ethnological, including Egyptian and other antiquities.
- Two cases foreign minerals.
- Three cases Eastern States minerals and ores.
- One case foreign paleontology.
- One case casts of rare fossils.
- Two cases corals and shells.
- Three cases not classified, owing to lack of case room.

On the tenth of June, Mr. Joseph Perkins was appointed Secretary and Accountant. From the commencement specimens of minerals began to come in, and a general interest on the part of the citizens became manifest. Correspondence has also gradually increased, and questions on matters within the province of the Bureau are asked and answered daily.

On the first of August Mr. Edward Booth was appointed chemist, and the foundation of a chemical laboratory laid, which should be made in the future the best possible, as this department is of the highest importance.

It has been the policy of the Bureau to collect maps of the counties of the State, and geological and mining maps generally, which has resulted in the acquisition of a large number. Some of them are now placed on the walls of the Museum, Library, and Office, for refer-

ence. While the work of the Bureau has been in progress several scientific gentlemen have been employed to prepare manuscript for publication on various subjects, all within the requirements of the Mining Bureau bill. The science of geology, to which all others are tributary, is so vast in its scope that no one human mind can fully grasp it in detail. It has been found necessary to divide the science into departments, and in many cases to subdivide into specialties. There are in California, gentlemen who have devoted their lives to these departments, and to them the special work of the Bureau should be intrusted. Owing to the great amount of time and labor required to institute the Bureau, and to set the Museum in operation, but little field work has been attempted. The State Mineralogist, has, however, found time to visit the locality of "*roscoelite*," near Coloma, El Dorado County (a new mineral of which but little is known), and to commence the study of the valuable iron deposits near Clipper Gap, in Placer County. He also visited a number of limestone quarries in the same county, the granite quarries at Penryn, and at Rocklin, the Thermal Springs at Calistoga, in Napa County, and a number of mines in the Counties of Placer and El Dorado, reports of which will appear in future publications.

In obtaining information relating to mines and mineral deposits in California, care has been taken to obtain the exact locality—section, township, and range—with a view to place them eventually on a sectional map of the State. When any new discovery is announced in the columns of the press, or any information obtained otherwise by the Bureau, it has been the custom to write for specimens and more accurate information. Experience has shown that while many are willing to send the desired specimens, but few are competent to do so. Many important things are overlooked that would attract the attention of a person of experience. Still the Museum has received many valuable additions by carrying out this plan. When any feature of special interest is thus developed, a memorandum has been made with a view to a thorough personal examination when time and the condition of the funds will permit. There have been many visitors to the Museum, but there is no way of estimating the number. Visitors do not register unless specially requested to do so. When the Museum becomes more important and extensive, there will be an attendant in charge whose duty will be to receive visitors, give information, and to keep a general supervision. When this is the case, no person will enter without registering name and residence. There seems to have been an impression that the Museum is a place suited only for mining men, while it is specially desirable that ladies and children, students of both sexes, strangers in the city, and the public generally, should make free use of it.

#### MINERALS OF THE PACIFIC COAST.

Many persons have the impression that gold, silver, copper, and quicksilver make up the sum of the mineral products of California. This is a mistake. Many other valuable minerals are abundant. Without regard to scientific classification, the following economic minerals may be mentioned, the localities of which are well known to mineralogists: platinum, iridium, ores of lead, cobalt, tin, tellurium-molybdenum, chromium, antimony, bismuth, nickel, zinc, arsenic, and iron; oxide, silicate, and carbonate of manganese; red and



yellow ocher; umber, carbonate and sulphate of baryta, lime-stones, marbles in many beautiful varieties, dolomite, hydraulic cement, gypsum, granite, syenite, porphyries, freestone, quartz sand, asbestos, mica, pegmatite, corundum, burh-stone, tripoli, diatomaceous earth, pumice-stone, asphaltum, mineral oils, fluor spar, strontianite, carbonate of magnesia, carbonate of soda, salt, sulphur, tunstate of iron and of manganese, lignite, graphite, fire-clay, borax, boracic acid, besides gems and minerals valuable only for ornamental purposes, and perhaps others; and there are no doubt unknown mineral resources in the State that may develop into sources of wealth. It should be the policy of the Bureau to discover, investigate, and bring them into notice.

#### DONATIONS TO THE MUSEUM AND LIBRARY.

As this list is intended as a memorandum only, and as some specimens received still remain unpacked, it is more than probable that the names of some donors have been overlooked. Errors and omissions will be rectified, and full details and localities given, in a future carefully prepared annual catalogue.

DONOR.	Article.	Where from.
Ambler, S. F.	One specimen sand from copper mine	California.
Ambler, S. F.	Four specimens copper ore	California.
Attosen, Mr.	One specimen selenite	Siberia.
Attwood, Melville	Four specimens minerals	California.
Attwood, Melville	One specimen electrum	California.
Attwood, Melville	One sample mineral water	California.
Attwood, Melville	Three specimens rocks	Nevada.
Britton & Rey	One map of San Francisco	
Bunker, Wm. M.	One specimen rock with dendrites	Nevada.
Bunker, Wm. M.	One specimen silver ore, chloride of silver	Nevada.
Blackburn, D.	One pamphlet, Hot Springs of Paso de Robles	California.
Blair, M. Y.	One specimen asbestos	
Benton, J. E.	One mining report	
Banks, Chas. W.	Fourteen specimens ore	Arizona.
Bacon & Co.	One pamphlet, "Business vs. Speculation"	
Bell, John	One specimen quartz with telluric gold	California.
Blake, Prof. W. P.	One specimen crystalline orpiment, etc.	
Blake, Prof. W. P.	Fifteen Reports of Paris Exposition	
Bixby, John F.	One specimen of chrome iron	California.
Booth, Edward	One pamphlet, Genesis of Cinnabar	
Brown, G. W.	One specimen stibnite	California.
Brumagin, Mrs. J. W.	One volume, Nature Displayed	
Brumagin, Miss Blanche	One sample quartz and chalcedony pebbles	California.
Brumagin, Miss Jennie	One sample sand	California.
Bluxome, Isaac	One pamphlet, Report on M. & Canal Co.	
Bluxome, Isaac	One sample clay	California.
Bluxome, Isaac	One specimen steatite	California.
Bluxome, Isaac	Five samples sand and gravel from hydraulic mines	California.
Barry, John D.	Two reports on mines	
Brastow, S. D.	One specimen gypsum	California.
Brastow, S. D.	One specimen pumice	California.
Brastow, S. D.	One specimen silver sandstone	Utah.
Bost, John W.	One map Merced County	
Baker, J. H.	Four specimens ores and minerals	Nevada.
Baker, J. H.	One specimen, Indian relic	Nevada.
Baker, J. H.	One specimen, Indian bird cage	Nevada.
Behrens, J.	One specimen aragonite	California.
Bateman, A.	One specimen silver ore	Nevada.

## DONATIONS—Continued.

DONOR.	Article.	Where from.
Burrows, H. L.	One specimen brick from great wall of China	
Bevan, W. J.	One specimen ore	California.
Carpenter, Ezra	Five specimens fossil oysters	California.
Carpenter, Ezra	Five specimens fossil bones	California.
Carpenter, Ezra	Seven specimens ores and minerals	California.
Carpenter, Ezra	Five specimens aragonite	California.
Carpenter, Ezra	Five specimens Indian relics	California.
Carpenter, Ezra	Five specimens tufa	California.
Carpenter, Ezra	Two samples mineral water	California.
Carpenter, Ezra	One map San Luis Obispo County	California.
California Iron Co.	One specimen white marble	California.
California Iron Co.	Three specimens hematite	California.
California Iron Co.	One specimen magnetite	California.
California Iron Co.	One sample water from salt spring	California.
Crane, E. M.	Seventy-five specimens silver sandstone, etc.	Utah.
Chilaud, E.	One specimen gold quartz	California.
Chilaud, E.	One specimen wall rock	California.
Cook, Seth	One specimen copper ore	California.
Cook & Spinks	One sample quartz sand from coal mine	California.
Cook & Spinks	One sample clay from coal mine	California.
Collins, S. W.	One sample auriferous sand	California.
Collins, S. W.	One specimen gold ore	California.
Collins, S. W.	One specimen orbicular diorite	California.
Collins, C. J.	One specimen thiolite	Nevada.
Collins, C. J.	One specimen calcite	Nevada.
Cohen, Richard	Six specimens silver ore	Nevada.
Coffin, Mrs. H. M.	One specimen volcanic rock	California.
Church, John A.	Six reports on mines and mining, etc.	
Church, A. S.	Fourteen specimens from Egypt	
Church, A. S.	Five specimens from Italy	
Church, A. S.	Three relics from Pompeii	
Church, A. S.	Three relics from Holy Land	
Church, A. S.	Fourteen mementos of travel	
Church, A. S.	Four volumes handbooks of travel	
Cal. Portland Cement Co.	One sample cement	California.
Cal. Portland Cement Co.	One sample slag from furnace	California.
Cal. Portland Cement Co.	Two samples cement test pieces	California.
Davis & Cowell	One specimen marble	California.
Deby, Julien	Two pamphlets, Diatomes	
Durden, H. S.	One specimen scutella interlineata	California.
Dana, Alfred W.	One sample diatomaceous earth	California.
Dietzler, Gen. Geo. W.	One specimen auriferous quartz	Georgia.
Dietzler, Gen. Geo. W.	One stone axe	
Dietzler, Gen. Geo. W.	One pamphlet, Evaporative Coolers	
Daggett, John	One specimen quartz with free gold	California.
DeWoody, J. F.	One specimen hyalite	California.
Dubois, P.	One specimen gold quartz	California.
Davis, J. Z.	Two samples peat	Ireland.
Davis, J. Z.	Two specimens coal	
Davis, J. Z.	Ten specimens minerals	
Davis, J. Z.	Three specimens silicified wood	
Davis, J. Z.	Twenty specimens corals	
Davis, J. Z.	Twenty specimens shells	
Davis, J. Z.	Five specimens fish	
Davis, J. Z.	One specimen bow and arrows, Yuma Indians	
Davis, J. Z.	Six specimens rocks	
Davis, J. Z.	Four specimens pine cones	California.
Davis, J. Z.	Three specimens ivory nut	
Davis, J. Z.	Ten specimens seaweed	
Davis, J. Z.	Five specimens colonial relics	
Davis, J. Z.	Two specimens relics of battle of New Orleans	
Davis, J. Z.	One specimen jaws of orca	
Davis, J. Z.	One specimen pile pierced by teredos	
Davis, J. Z.	Specimen artesian borings	
Davis, J. Z.	Seventy specimens, various	
Davis, N. S.	One specimen aragonite	Arizona.
Dixon, John	One specimen ore	California.

## DONATIONS—Continued.

DONOR.	Article.	Where from.
Davis, Wm.	One specimen iron ore	California.
Everett, Jas. W.	One Indian arrow-head	California.
Elmore, R. P.	One specimen sphalerite	Arizona.
Elder & Dobbie	Eight volumes City and Coast Directories	California.
Fauntleroy, W. H.	One specimen hematite	California.
Fresno Enterprise Co.	One specimen gold quartz	California.
Filcher, J. A.	Two specimens copper ore	California.
Filcher, J. A.	One specimen silicified wood	California.
Filcher, J. A.	One specimen ferruginous clay	California.
Filcher, J. A.	One specimen diorite	California.
Foye Bros.	One specimen graphite	New York.
Flick, Wm. F.	One specimen auriferous quartz	California.
Flick, Wm. F.	One specimen clay	California.
Fulton, R. L.	Two specimens thimolite	Nevada.
Fulton, R. L.	Two specimens silver ore	Nevada.
Fulton, R. L.	One specimen silicified wood	California.
Fernbach, Victor	Six specimens silver ore	Nevada.
Fuller, O.	Two specimens ore	California.
Fowler, Mr.	Twelve specimens coal	California.
Fox, C. N.	One specimen ore	California.
Fowler, Jas. E.	Two specimens graphite	California.
Gladding, McBean & Co.	Five specimens fire brick	California.
Gladding, McBean & Co.	Two specimens floating brick	California.
Gladding, McBean & Co.	Three specimens crucibles	California.
Gladding, McBean & Co.	Two specimens clay	California.
Gladding, McBean & Co.	Seventeen specimens pottery	California.
Gallagher, Edward A. T.	Two Indian relics	California.
Graves, Hon. W. J.	One specimen diatomaceous earth	California.
Garratt, Hon. W. T.	One sample mineral water	Arizona.
Grayson, Geo. W.	One specimen calcite and barite	California.
George, Dr. S. G.	Five specimens minerals	California.
George, Dr. S. G.	Eight specimens silver ore	California.
George, Dr. S. G.	One specimen rock	California.
George, Dr. S. G.	One specimen fossils	California.
Gibbes, Chas. D.	Two specimens freestone	New South Wales.
Gourguet, D.	One specimen auriferous sulphurets	California.
Gourguet, D.	One specimen rock	California.
Guilbert, E. D.	One specimen silver ore	Utah.
Gibbons, Miss E. P.	Four samples kauri gum	New Zealand.
Hanks, Henry G.	Seventy-five specimens minerals, ores, rocks, etc.	
Hanks, Henry G.	Sixty-six volumes scientific works, reports, etc.	
Hanks, Henry G.	Eighteen maps, geological, etc.	
Heydenfeldt, Judge S.	Twenty-nine volumes reports, etc.	
Harvey, Dr. Philip	One skull flathead Indian	Oregon.
Haft, E. E.	One specimen silver ore	California.
Hale, Wm. E.	One specimen hematite	California.
Hale, Wm. E.	Three specimens magnetite	California.
Heydenfeldt, S., Jr.	Nine volumes publications	
Heydenfeldt, S., Jr.	One specimen stream tin	Mexico.
Heydenfeldt, S., Jr.	Two specimens minerals	California.
Heydenfeldt, S., Jr.	One specimen diatomaceous earth	California.
Heydenfeldt, S., Jr.	One specimen silver ore	Nevada.
Hellings, Wm. B.	One specimen anglesite	Arizona.
Hendy, Joshua	One specimen lignite	Alaska.
Healy, Chas. T.	One specimen coal	California.
Hiscox, H. O.	Three specimens copper ore and copper	California.
Hittell, John S.	One sample Piute sugar	Nevada.
Hume, Geo. W.	One bronze chain cable	Oregon.
Horton, Mr.	One specimen silver gold ore	Idaho.
Holt, John H.	Two specimens paleozoic fossils	California.
Holmes, A. J.	Twelve specimens silver ore	Arizona.
Holmes, A. J.	One specimen wood, from Casa Grande	Arizona.
Holmes, A. J.	One specimen wall-rock	Arizona.
Hughes, D. F.	One specimen platiniridium	California.
Hobart, J. H.	Two specimens, rock and pyrites	California.
Hughes, Mr.	One sample wax, from ancient wreck	Oregon.
Hoagland, Osborn & Co.	One specimen ore	California.

## DONATIONS—Continued.

DONOR.	Article.	Where from.
Hurley, Horace	One specimen jefferisite	California.
Idaho Mining Company	One specimen gold quartz	California.
Isham, J. B. G.	One map, Norway and Sweden (geological)	California.
James, C. A.	One specimen gold quartz	California.
James, David B.	One model of quartz crusher	California.
James, David B.	One specimen of quartz crushed in same	California.
Jacques, Mrs. James	One specimen polished carnelian	California.
Jacobi, M.	One specimen red lava	California.
Jewell, T. E.	One specimen graphite	Mexico.
Jones, Charles C.	One specimen copper ore	California.
Jones, Charles C.	One specimen native copper	California.
Jones, A. S.	Two specimens nickel ore	California.
Joubert, Jules	One volume of Report on Mining	New South Wales.
Kimble, George W.	One specimen magnetite	California.
Kimble, George W.	Four specimens roscelite	California.
Kimble, George W.	Two boxes roscelite	California.
Kirkpatrick, J. M.	One specimen silver-lead ore	Arizona.
Kinney, Dr. Aug. C.	Ten specimens fossils	Oregon.
Kinney, Dr. Aug. C.	One specimen jet	Oregon.
Kinney, Dr. Aug. C.	One specimen wax	Oregon.
Knox, Richard F.	One specimen silver ore	Maine.
Kustel, G.	One volume, Roasting Gold and Silver Ores	California.
Kelly, G. P.	One specimen chalcedony	Mexico.
Lee, Bruce	One specimen auriferous pyrites and hematite	California.
Levy, H. M.	One specimen wulfenite	Nevada.
Levy, H. M.	One specimen aragonite	Nevada.
Lent, William H.	One specimen galena	Colorado.
Lewis, William A.	One specimen gold quartz	California.
Lorquin, E. T.	Two specimens mammalian fossils	Oregon.
Lorquin, E. T.	One Indian relic	Oregon.
Lockington, W. N.	One vol. Report of Commissioner of Fisheries	California.
Larson, A.	Eight specimens gold ores and wall rocks	California.
Mackay, John W.	Two specimens silver ore	Nevada.
Mackay, John W.	One specimen ferruginous limestone concretion	New Mexico.
Maize, H. B.	One specimen galena in quartz	California.
Mackey & Fenton	One specimen magnetite	Oregon.
Merrill, F. H.	Three specimens minerals	California.
McNeir, G. M.	One specimen obsidian	California.
Mitchell, Charles	One stone hammer	California.
Mills, David J.	One specimen sandstone	California.
Moody, W. H.	One Indian arrowhead	California.
Moore, W. H.	One specimen argentiferous copper ore	California.
Moore, L. A.	One specimen silicified wood	Nevada.
Moore, J. P.	One volume Pacific Coast Fungi	California.
Myers, A.	One specimen auriferous sulphurets	California.
McCormick, Hugh	One specimen azurite	California.
McCormick, Hugh	One specimen ulexite	California.
McCormick, Hugh	One specimen trona	California.
Muir, John A.	One specimen orbicular diorite	California.
McWorthy, T. J.	One specimen auriferous sulphurets	California.
McMillan, Mr.	One map of Yuba County	California.
McMurtre, Dr. William	One Report on Culture of Sumac in Sicily	California.
Murdoch, Dr. G. L.	One map of Western Oregon	California.
Merrill, C. R.	One specimen white marble	California.
Newsome, D. F.	Four samples mineral water	California.
Newton, Henry A.	Two specimens gold quartz	California.
Norris, Richard	Five specimens chromic iron	California.
Norris, Smith	One specimen gold quartz	California.
O'Daly, John Ingham	Two specimens stream tin	New South Wales.
O'Daly, John Ingham	One Report on Tin Mines of California	California.
O'Daly, John Ingham	One Blue Book of New South Wales	California.
O'Daly, John Ingham	Six maps of mines in New South Wales	California.
Oliver, William Letts	One sample borax	Chili.
Oliver, William Letts	One sample borate of lime	Bolivia.
Oliver, William Letts	One sample borax	Peru.
Pailhet, E. W.	Three relics	Egypt.
Pailhet, E. W.	One specimen gold quartz	California.

## DONATIONS—Continued.

DONOR.	Article.	Where from.
Pailhet, E. W.-----	One specimen Brazilian pebbles-----	Brazil.
Pailhet, E. W.-----	One specimen silver ore with sphalerite-----	Arizona.
Parker, Dr. W. C.-----	Seven specimens silver ore-----	California.
Paul, Almarin B.-----	One specimen gold in chalcedony-----	California.
Pew, J. W.-----	Two specimens silver ore-----	Nevada.
Pew, J. W.-----	One specimen silver sandstone-----	Utah.
Pew, J. W.-----	One specimen silver ore-----	California.
Pew, J. W.-----	One specimen asbestos-----	California.
Perrin, R. J.-----	Two specimens silver ore-----	California.
Porter, David-----	Two specimens iron ore and rock-----	California.
Porter, David-----	One volume Memoir on New York Canals-----	-----
Perkins, Joseph-----	Three specimens ore-----	Nevada.
Peterson, Gus.-----	One specimen solar salt-----	California.
Pritchard, James A.-----	One specimen ore-----	California.
Perrier & Galbergue-----	One specimen calcite-----	California.
Palmer, Joseph C.-----	Two specimens fossils-----	California.
Palmer, Joseph C.-----	Eight specimens cinnabar-----	California.
Randol, J. B.-----	Seven specimens wall and country rock-----	California.
Randol, J. B.-----	Two specimens adobes with cinnabar-----	California.
Randol, J. B.-----	One specimen soot from condenser-----	-----
Randol, J. B.-----	One specimen metallic quicksilver-----	-----
Raymond, A. S.-----	One specimen copper ore-----	British Columbia.
Rodrick, Frank-----	One specimen orbicular diorite-----	California.
Rose, Wm.-----	Two maps Como Lode-----	-----
Soper, Wm. H.-----	Eight specimens ores-----	California.
Stambaugh, Dr. S. S.-----	One phallic emblem-----	-----
State Geological Society-----	Thirteen hundred and twenty-seven specimens ores, minerals, etc.-----	-----
State Geological Society-----	Seventy-eight volumes, various-----	-----
State Geological Society-----	Twenty-five pamphlets, various-----	-----
San Francisco Glass Co.-----	One specimen devitrified glass-----	-----
Sears, W. H.-----	One specimen ore-----	California.
Sherwood, Henry-----	One specimen chalcedony-----	California.
Spencer, Geo. W.-----	One specimen yellow clay-----	California.
Spencer, Geo. W.-----	One specimen sulphide of iron-----	California.
Sheldon, N. P.-----	One specimen stibnite-----	Utah.
Stewart, Hon. W. M.-----	One model Noonday Mine-----	California.
Selby Smelting and Lead Co.-----	One specimen sulphate of copper-----	-----
Sweet, S. S.-----	One specimen asbestos-----	California.
Sleeper, W. O.-----	One specimen rock-----	California.
Sleeper, T. P.-----	One specimen sulphuret ore-----	-----
Steinhagen, P.-----	Sixteen samples asbestos manufactures-----	-----
Sherburne, J. S.-----	Two specimens silver ore-----	New Mexico.
Sherburne, J. S.-----	One specimen wall rock-----	New Mexico.
Sherburne, J. S.-----	One specimen epidote-----	-----
Smith, Mrs. Fanny E.-----	One specimen chalcedonic quartz-----	Colorado.
Schmidt, W.-----	One specimen micaceous hematite-----	Nevada.
Skidmore, W. A.-----	Six mining reports-----	-----
Skidmore, W. A.-----	One specimen telluric gold-----	California.
Scupham, J. R.-----	One specimen obsidian-----	California.
Sutro Tunnel Co.-----	Five volumes reports etc. on Tunnel Co.-----	-----
Schlagintweit, Robert von-----	One volume California Lande und Leute-----	-----
Taylor, J. M.-----	One specimen wall rock-----	Nevada.
Thayer, B. B.-----	Forty-two specimens cinnabar, etc.-----	California.
Thibodo, Doctor A. J.-----	One specimen gypsum-----	Arizona.
Thibodo, Doctor A. J.-----	One specimen zinkenite-----	Idaho.
Thibodo, Doctor A. J.-----	One specimen limonite-----	Arizona.
Thibodo, Doctor A. J.-----	One specimen copper ore-----	Nevada.
Thornton, H. J.-----	One specimen dendrites-----	Nevada.
Thureau, G.-----	One volume Reports on Mines and Mining in Nevada-----	-----
Tubbs, H.-----	Three specimens fossil shells-----	California.
Utter, F.-----	One specimen copper ore-----	California.
Vosburgh, J. J.-----	One specimen arrowheads and beads-----	Arizona.
Wasson, Hon. Joseph-----	One sample mineral water-----	California.
Wasson, Hon. Joseph-----	Seven specimens minerals and rocks-----	California.

## DONATIONS—Continued.

DONOR.	Article.	Where from.
Wasson, Hon. Joseph	Ten specimens ores	California.
Wasson, Hon. Joseph	Eleven volumes mining reports, etc.	
Wasson, Hon. Joseph	Four maps mining districts	
Walker, Doctor D.	One specimen silver ore	California.
Wier, James C.	One specimen copper ore	Nevada.
Whittier, Fuller & Co.	One specimen pumice stone	California.
Whittier, Fuller & Co.	Ten samples chemical manufactures	California.
Wilson, J. Downer	One specimen calcite	Arizona.
Wilson, J. Downer	Two specimens wulfenite	Arizona.
Wilson, J. Downer	One specimen gypsum	Arizona.
Wilson, J. Downer	Two specimens lead ores	Arizona.
Woodhull, W. S.	One specimen silver ore	California.
Wyman, G. D.	One specimen silver ore	Arizona.
Woodbury, J. G.	One specimen magnetite	California.
Ward & Howell	Four catalogues fossils, etc.	
Whitfield, Professor R. P.	One volume Annual Reports American Museum of Natural History	
Wheeler, Capt. George M.	Ten volumes Reports United States Surveys West of One Hundredth Meridian	
Wheeler, Capt. George M.	Two maps Washoe mining region	
Wilcox, A. O.	Two specimens rock salt	Nevada.
Winder, William A.	One specimen gypsum	California.
Woodhull, S. D.	Twenty-seven specimens ores, rocks, etc.	California.
Young, Joseph W., Jr.	One specimen gold quartz	California.
Exchange and purchase	One hundred and thirty-five specimens rocks, ores, minerals, etc.	Various sources.
Exchange and purchase	Fifty-two volumes reports, etc.	Various sources.
Exchange and purchase	Twenty-eight maps—mining, geological, and county	Various sources.

## RECORD OF VISITORS REGISTERED.

June, no record—estimated 150; July, 272; August, 166; September, 287; October, 254; November, 215; total, 1,344.

NOTE.—This does not show the actual number of visitors, as many do not enter their names at all, and a still larger number think, after the first entry, no further entry is desirable, although they may visit the Museum frequently.

## CORRESPONDENCE.

Three hundred and ninety-nine letters have been written to three hundred and twenty-one correspondents; one hundred and eighty-nine letters received from one hundred and forty correspondents.

## REPORT OF THE CHEMIST.

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The Chemical Laboratory connected with the Bureau has been in operation so short a time that the quantity of analytical work performed has not been as great as desirable. A considerable number of mineralogical and mineralogico-chemical investigations have been made in addition to complete analyses. All doubtful minerals that have been presented to the Bureau, have been determined and in many cases analyzed. In addition to the determination of minerals, much of the work has consisted of examination of supposed ores, for gold, silver, copper, nickel, tin, etc.

The principal specimens that have been determined are: Calcite and Quartz; Ferruginous Limestone; Bronze (chain washed ashore in Oregon); Zinkenite; Concretionary Calcite; Kaolinite; Psilomelane, Rhodocrosite, and Quartz; Calcite, Cuprite, Malachite, Melanconite; Native Silver; Galenite and Sphalerite; Clay; Sphalerite; Metallic Gold, Lead, Mercury; Limestone; Galenite, Siderite, Quartz; Obsidian; Pyrite; Magnetite; Chalcopyrite and Erubescite; Nagyagite; Micaceous Hematite; Bindheimite, Anglesite, Azurite; Graphite; Jefferisite; Stibnite; Sphalerite and Calcite; Epidote; Sphalerite and Galenite; Cerargyrite; Pyrophyllite; Jefferisite; Chromite; Argentite; Aragonite; Pyrite; Calistoga water, for gold; Malachite, Cuprite, Native Copper; Ferruginous Limestone; Bindheimite; Aragonite; Magnetite; Wulfenite; Cerussite; Selenite; Calcite, Limonite, Barite; Selenite; Melanterite; Garnet; Galena, Siderite, Quartz; Sphalerite; Chalcopyrite; Native Copper, Cuprite, Malachite, Limonite, and Calcite; Sphalerite; Azurite; Mispickel; Hydraulic Lime; Ulexite; Soda; Coal; Borax; Clay; Selenite; Erythrite; Argentite, Chrysocolla, Malachite; Erubescite; Cuprite and Malachite; Hematite; Chromite and Ripidolite; Hematite; Calcite; Nagyagite; Sphalerite; Calamine; Calcareous Sandstone and Cerargyrite; Manganiferous Clay; Limonite; Limestone; Meteoric Iron; Nickel; Metallic Iron; Limestone; Calcite; Limonite; Graphite; Meteoric Iron; Hornblende; Chalcedony.

Besides these, a large number of negative determinations have been made. That is, an examination for a constituent which was found to be absent, as in many of the supposed gold and silver ores. Complete analyses have been made principally with regard to the iron ores of the State.

### MAGNETITE—POTTER'S IRON MINE, SHASTA COUNTY.

Contains 71.16 per cent. of iron.

Silica	49
Ferrous Oxide	19.59
Ferric Oxide	79.90
	99.98

## LIMONITE—CLIPPER GAP, PLACER COUNTY.

Contains 53.88 per cent. of iron.

Silica .....	9.28
Hygroscopic moisture .....	2.40
Combined water .....	11.30
Ferric oxide .....	76.97
Sulphur .....	Trace
	<hr/> 99.95

## LIMONITE—CLIPPER GAP, PLACER COUNTY.

Contains 56.58 per cent. of iron.

Silica .....	7.16
Hygroscopic moisture .....	1.90
Combined water .....	9.90
Ferric oxide .....	80.83
Sulphur .....	Trace
Phosphorus .....	Trace
	<hr/> 99.79

## OCHEROUS LIMONITE—CLIPPER GAP, PLACER COUNTY.

Contains 55.93 per cent. of iron.

Silica .....	5.70
Hygroscopic moisture .....	3.60
Combined water .....	11.30
Ferric oxide .....	79.90
Sulphur .....	Trace
Phosphorus .....	Trace
	<hr/> 100.50

## RED EARTH—NEAR CLIPPER GAP, PLACER COUNTY.

Contains 38.68 per cent. of iron.

Silica, etc. ....	34.55
Hygroscopic moisture .....	2.90
Combined water .....	6.45
Ferric oxide .....	55.25
Lime .....	1.65
Sulphur .....	Trace
Phosphorus .....	Trace
	<hr/> 100.60

## MAGNETITE—PLACER COUNTY.

Contains 68.28 per cent. of iron.

Silica .....	3.23
Ferrous oxide .....	17.06
Ferric oxide .....	80.05
	<hr/> 100.34

## LIMESTONE—PLACER COUNTY.

Silica .....	.25
Ferric oxide .....	.25
Magnesia .....	Trace
Lime .....	55.72
Carbonic acid .....	43.78
	<hr/> 100.00

## LIMESTONE—NEAR CLIPPER GAP, PLACER COUNTY.

Silica .....	Trace
Ferric oxide .....	.05
Magnesia .....	Trace
Lime .....	55.97
Carbonic acid .....	43.98
	<hr/> 100.00



## LIMESTONE—NEAR CLIPPER GAP, PLACER COUNTY.

Silica .....	.15
Ferric oxide .....	.35
Magnesia .....	Trace
Lime .....	55.72
Carbonic acid .....	43.78
	<hr/>
	100.00

## ARAGONITE—SUISUN, SOLANO COUNTY.

Silica .....	.02
Ferric oxide .....	.07
Magnesia .....	.50
Lime .....	55.94
Carbonic acid .....	43.96
	<hr/>
	100.49

## COAL—SAN BENITO COUNTY.

Water .....	18.40
Volatile combustible matter .....	31.15
Fixed carbon .....	30.00
Ash .....	20.45
	<hr/>
	100.00

## HYDRAULIC LIMESTONE.

Water .....	.60
Ferrous oxide .....	11.80
Magnesia .....	1.95
Lime .....	38.27
Carbonic acid .....	32.21
Insoluble residue .....	15.15
	<hr/>
	99.98

## INDURATED CLAY—SAN FRANCISCO.

Silica .....	56.51
Alumina .....	21.33
Ferric oxide .....	12.31
Lime .....	3.53
Magnesia .....	Trace
Water .....	6.30
	<hr/>
	99.98

## LIGNITE—IONE VALLEY, AMADOR COUNTY.

Water .....	4.00
Volatile combustible matter .....	36.90
Fixed carbon .....	13.10
Ash .....	46.00
	<hr/>
	100.00

A large number of partial analyses have also been made where the quantities of one or more of the constituents of a complex mineral have been determined.

The work done in the laboratory has all been of a practical character, and this department promises to become of great importance as the Bureau becomes developed.

EDWARD BOOTH,  
Chemist.

## STATEMENT

*Of Receipts and Expenditures of the California State Mining Bureau, December 1, 1880.*

Expenditures.	Amounts.	Receipts.	Amounts.
Postage.....	\$38 20	Warrants received from State Con- troller.....	\$4,200 00
Museum expense.....	2,064 76	Advances by bank, Wells, Fargo & Co.....	2,118 78
General expense.....	1,516 51		
Maps purchased.....	60 00		
Library books purchased.....	57 50		
Salaries and labor.....	2,392 50		
Traveling expenses.....	88 80		
Interest on advances.....	100 51		
Total.....	\$6,318 78	Total.....	\$6,318 78

STATE OF CALIFORNIA, }  
County of San Francisco. } ss.

I, Henry G. Hanks, State Mineralogist, do swear that the foregoing is a true statement of the receipts and expenditures of the California State Mining Bureau for the six months ending November 30th, 1880, as taken from the books of this office, vouchers for all of which being now on file.

HENRY G. HANKS.

Subscribed and sworn to before me this 6th day of December, 1880.

SAM'L S. MURFEY, Notary Public.

## MEMORANDUM

*Account of Mining Bureau Fund, San Francisco.*

Receipts.	Amounts.	Expenditures.	Amounts.
Collected by R. H. Sinton, License Collector of San Francisco, and paid in to State Treasurer—		Warrant account—	
Quarter ending June 30th, 1880.....	\$1,341 60	Salary of Mineralogist.....	\$250 00
Quarter ending Sept. 30th, 1880.....	3,220 60	Salary of Mineralogist.....	750 00
Collected but not paid in, quarter ending December 31st, 1880.....	3,481 00	General expenses.....	\$1,000 00
		General expenses.....	3,200 00
		Balance to credit of Mining Bureau.....	3,543 20
Total.....	\$8,743 20	Total.....	\$8,743 20

## LOAN COLLECTIONS.

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While the institution is young, it would be desirable to encourage those having valuable collections to place them in the Museum as loans. There seems no objection to receiving such loan collections. The plan is quite common in Museums elsewhere. There are many persons who would gladly be relieved of the care of their collections, who are not willing, or who cannot afford to donate them. Such collections often come into the possession of the Museum, either by final donation or by purchase. The slight expense of labels and care is offset by the advantage of temporary possession. The owner should be required to enter into an agreement not to remove them for a specified time, and the Museum should not receive them faster than they can be cared for and placed on exhibition. The uniform Museum cases would be used for their reception, and labels printed, but not entered on the catalogue. They might be designated as Loan Collection No. 1, 2, 3, etc., as the case might be. In the meantime, the work of general collection would be in progress, and when those loaned were removed the cases would be filled with other specimens.

Several valuable and extensive collections can be obtained upon these terms, and others have been promised as donations as soon as a safe and permanent building is secured.

### GREAT MUSEUMS OF THE WORLD AND THEIR IMPORTANCE.

The collection of objects of interest for study and reference is not peculiar to any nation or country, but seems to be coeval with civilization. The name Museum denotes "a Temple of the Muses," and is said to have been given to a building in Alexandria, in which the celebrated library was placed. In early times they were few, and were confined to the great centers, but at the present day may be found in almost every country, even in colonies and smaller States. Any country which does not give some attention to the collecting and display of its own resources, becomes a prey to others, in the sense of having its natural and artificial products displayed in Museums of other lands, and must submit to the humiliation of being better represented and known abroad than at home. The first Museum, according to the modern idea, was at Florence, when that city was under the rule of Cosmo the Elder, although no doubt there were similar ones, but of less importance, long before.

The English nation is justly proud of the British Museum, which ranks first as a single national collection. This great institution was, like many others, founded on the purchase of a private collection. Sir Hans Sloane provided in his will that his entire Museum, valued at £50,000, should be offered to the government for £20,000. The offer was accepted by an Act of Parliament, in seventeen hundred and

fifty-three, providing for the purchase of the Sloane Collection, the Harleian Collection of Manuscripts, and for the reception of the Cottonian Library. By the provision of this Act £300,000 were raised by a public lottery, £20,000 paid for the Sloane Collection, £10,000 for the Harleian Collection, and £10,250 for Montague House, Bloomsbury, London, the mansion of the Earl of Halifax, which combined, formed the nucleus of the British Museum. Since that time the nation has subscribed large sums for building and additions. The total expenditure by the Government up to eighteen hundred and fifty-eight, is estimated at £1,500,000 sterling. This is not to be taken as the sum of its value, as it has received many donations which cannot be estimated.

The Museum of Practical Geology of London was established in eighteen hundred and thirty-five. The Director of the Geological Survey of England, Sir Henry de la Bache, became impressed with the importance of making a collection which should present all the geological features of the kingdom, and specially those of economic geology. He called the attention of the Government to the subject, and met with cordial coöperation. The collections were at first placed in a somewhat obscure locality, but they grew in so surprising a manner, principally by donation, that the present elegant building in Jernyn street was built by the Government for their reception, at a cost of thirty thousand pounds. The collections represent the mineral products of Great Britain and her Colonies. The specimens of marble, porphyry, and other ornamental stones are not only shown in mass, but sculptured into vases, columns, monuments, and even into statuary, by distinguished artists. There are on exhibition models of mines and mining machinery, sections and geological studies. While the clays are shown in their natural and crude state, they are also there transformed into wares both useful and ornamental. All the manufactured products of natural material are shown grouped in such a manner as to be instructive as well as interesting. Like most of the other European Museums it is thrown open free to the public.

Other Museums in London of special importance are: The South Kensington, United Service, Missionaries, Asiatic, Soane, East Indian, Surgeons' College, Geological Society, and National Gallery.

Paris might be justly called a City of Museums; besides those of the Louvre, the following may be mentioned: Museum of the Luxembourg, Museum of Natural History, Museum of Natural Science, Museum of Mineralogy and Geology, Museum or Gallery of Botany, Museum of Comparative Anatomy, Museum of Artillery, Colonial Museum, Gallo Romain, School of Medicine, Museum of French Monuments, Museum of Antiquities Hotel de Cluny, Museum of Medals, Municipal Museum, Museum of Mineralogy at the School of Mines, and others.

The last mentioned Museum occupies thirteen large rooms. The French minerals are arranged by departments in alphabetical succession. A side-room is devoted to the collections made by the Prince Napoleon in Iceland, Greenland, Sweden, Sicily, and other countries. In the geological department may be seen the skeleton of an ichthyosaurus, and the entire set of fossil types of the Paris basin, collected and arranged by Cuvier and Brongniart.

The Museums of the Louvre are so vast and magnificent that no description in place here could convey more than a faint idea of

them. It can only be said that they consist of a number of departments filled with the rarest and most interesting collections, made by France during a period when she was mistress of nearly all the world, and that no expense has been spared by the nation.

The commencement seems to have been the donation of nine hundred books by Charles V. In seventeen hundred and ninety-three the pictures, statues, vases, etc., formerly kept in the palaces, were deposited in the old Louvre, and the Museum was opened to the public in August of that year. In eighteen hundred and three, by order of Napoleon, the present Museums were planned, and the great staircases built. All the objects of art and the curiosities taken from conquered nations found a place here. During the years of its existence many collections have been received by donations, the value of which can hardly be expressed. The Louvre and its precious contents have suffered much at the hands of the French people during the numerous revolutions, yet it is now one of the grandest Museums in the world.

The following is a partial list of the departments of the Museum of the Louvre: Museum of Egyptian Antiquities, Museum of Pictures, Museum of Drawing, Museum of Sovereigns, containing a collection of all the precious articles owned by the Sovereigns of France; Museum of Spanish Antiques; Museum of Greece and Egypt, Naval Museum, and the Algerian Museum.

Great attention has been paid to Museums in Rome. In the days of her power, conquered countries were forced to contribute to the Museums of the Eternal City, then in their infancy. In succeeding years they have grown until now they stand unequalled in the world. They are specially rich in works of art, both ancient and modern—in which department those of England and the United States cannot hope to compare.

The following is a partial list of them, the first five having a place in the Vatican: Museo Pio Clementino, which is the nucleus of the great Vatican Museum; Museo Chiarmonti, divided into thirty sections, and containing seven hundred marble sculptures; Museo Gregoriano, mostly Etruscan antiquities, founded by Gregory XVI, in eighteen hundred and thirty-six, contained in twelve rooms; Egyptian Museum; Museum of Christian Antiquities; Museo Gregorianum Lateranense; Museo Italico, newly instituted; Museo Lapidario, devoted to inscriptions only; Museo Kircheriano, founded by Kircher in the last century; Museo Medioevale, products of Italian handicraft; Captoline, ancient Rome, founded by Innocent X. Many rare things were taken from this Muesum by the French, but were returned to Pius VII; Christian Museum, ancient Rome, founded by Pius IX.

The American Museum of Natural History in Central Park, New York, organized in eighteen hundred and sixty-nine, has, through the munificence of private citizens and liberal acts of the State Legislature, become one of the finest in the world in its special line. The aid received from private citizens is something remarkable. One hundred and seventy-five prominent men of New York, whose names appear in the reports, contributed over two hundred thousand dollars towards the establishment of this institution. An Act of the Legislature provided for the erection of a Museum building, to cost at least five hundred thousand dollars, and donated all the duplicate specimens belonging to the State. There have been

many very valuable private collections donated and others bought, sixty-five thousand dollars being paid for the collection of Professor Hall, for years State Geologist of New York.

It is not the intention to give here a catalogue of all the great collections of the world, but to call attention to their importance, and to the fact that the institution of Museums is universal in foreign countries, and that one of the principal reasons why our young people are sent abroad for higher education is because of the facilities offered by the Museums of the great cities of Europe. This subject is attracting the attention of Americans, and nearly all our larger cities have made a commencement, while the taste for private collections is becoming widespread. In this we are simply repeating what has been done elsewhere, history showing that nearly all the great collections in the world had their origin in a nucleus, the life work of some individual.

The Pacific Coast cannot expect for many years to vie with the great Museums of the old world, nor would it be wise to attempt it, but we can at least lay the foundation for future superstructure. Our Museum should in time become a depository for everything historical and statistical in the State. Duplicates that accumulate should be used for exchanges, and for the public schools of the State for educational purposes.

Where it is not possible to obtain original specimens, it would be well to represent them by casts, which now may be purchased cheaply. At the end of each year a complete catalogue of the specimens acquired should be published, to be supplemented by others annually. To make this plan effective the number once given to a specimen or volume should never be changed.

#### PROSPECTING,

As understood in California, is simply searching for deposits of the precious metals. It dates back to the earliest history, hammers of stone, and gads, and wedges of copper being found in ancient mines in Siberia, and in mines probably still more ancient at Lake Superior.

From the first discovery of gold in California to the present time, the spirit of adventure which brought the early gold hunters to the Pacific Coast has led them to explore unknown portions of the country in search of more extensive and valuable deposits of the precious metals. Successive years of wild life, and the mountain freedom of California, has had the effect on some natures to cause a thirst for adventure to the extent that nothing but death can hold them in check. To this class of men the world is mainly indebted for the wonderful development of our State. To them belongs the credit of discovering the Comstock lode in Nevada, and many other mines of silver and gold in California and neighboring States and Territories. No danger appals them; no hardship or privation is ever too great for them to brave. At the time of the discovery of the Comstock the excitement extended to all classes, and the wildest speculation was regarded as a legitimate business operation. While the excitement led to the most astonishing development of the country at large, it proved ruinous to individuals, except in a few cases, not from any fault of the mines, but from ignorance and inexperience of those engaged in working them; still through the agency

of the prospectors it has been proved that the whole country abounds in mineral wealth beyond the power of the present generation to realize. From the Mexican boundary to the most northern point possessed by the United States, the most remarkable discoveries have been made.

There are two ways of prospecting, which differ as to the modes or methods practiced. One is the examination of alluvial deposits to ascertain if they contain gold, and if so, whether the metal is in sufficiently large quantities to pay for working; the other is the search for mineral veins, and when found, making such tests as will determine their value.

The usual mode of prospecting for placer gold is to dig a hole like a shallow well in a gulch, or bed of a stream. If the "bed-rock" is reached the chances of finding gold are considered much better than when sinking in the alluvial deposits which overlie the rock formations. At intervals, as the work progresses, a sheet-iron pan, much like an ordinary milk pan in shape, is filled with the earth and taken to the nearest stream. The prospector sits at the edge of the water, and taking the pan in both hands sinks it slowly beneath the surface of the water; lifting it, now full to the brim, he carefully breaks the lumps with his fingers and stirs the muddy mass until the water has sufficiently softened it, then sinks the pan again beneath the water, giving to it an oscillating motion, with care lest any of the heavier matters escape. A large portion of the muddy impurity flows over the edge of the pan. What remains can be examined more carefully. It generally occurs that a quantity of pebbles and fragments of rocks are found in the pan. These are carefully washed and as carefully examined. It is at this stage that lumps of gold called "*nuggets*" are occasionally found, a much more frequent accident in the palmy days of placer mining in California than at present. If an examination of the pebbles shows them to be worthless they are raked out with the fingers and thrown aside. This operation is continued until but a small residue remains in the pan, consisting mainly of magnetic sand from disintegrated volcanic rocks of former ages. This is sometimes removed with a magnet while still under water, but usually the washing is very carefully continued until the gold begins to appear, when it is dried in the pan, the black sand removed with the magnet, and the gold examined. In ordinary prospecting the skillful miner so agitates the contents of the pan in the last stage of the operation as to cause the sand slowly to recede over the bottom, and the precious metal to appear as a golden fringe, rendered more distinctly visible by the dark contrast of the magnetic residue. If a single particle of gold remains in the pan the prospector says that he has found "the color;" if more, the value is expressed in cents to the pan. Five cents to the pan is considered a good prospect in placer mining, while some hydraulic mines are profitable at four cents to the ton.

It is the delight of the prospector to roam over the mountains and hills in search of new mines, guided either by reports of rich discoveries or by surface indications which would escape the notice of the casual observer. He is ready to brave any danger, and actually enjoys the narrowest possible escapes from death from the excitement they afford. In skirting the hills, he looks for "*float*," by which may be understood fragments of the rocky formations lying on the hillsides above, or along the watercourses, and which have

been brought down by various causes to the lower levels. He examines the croppings, ascending by degrees, until the vein or ledge is reached. If the examination is satisfactory, he builds a rough monument of stones upon the discovery and places his notice of location, which will hold the claim as long as he complies with the mining laws. It is remarkable how all classes respect these monuments, and how seldom they are disturbed. A man who would steal a horse without hesitation will turn sorrowfully from a rich mine protected only by a pile of stones and a dirty piece of paper.

Quartz veins generally "*crop out*" in well marked ledges, usually presenting a wall of barren white quartz. It is quite an unusual thing to find rich rock at the surface. A prospect hole is usually sunk on the foot-wall, if the vein is inclined. If there is a clay seam or "*gouge*" near the wall, the chances are better for a good mine. All indications of copper, iron stain, sulphurets, gossan, pyrites, galena, or other minerals, are closely examined. When the sinking has been extended to a few feet, samples of the rock are broken from the ledge and prospected for gold, which is generally done in a horn spoon, sometimes in a miner's pan, less frequently on the blade of a common shovel, and still less frequently in a "*batea*," although the latter is by far the most effective, but is not so generally understood by miners. The horn spoon is a long shallow trough cut in a peculiar manner from a large ox horn.

The rock is crushed by pounding in an iron mortar or grinding on a flat stone with a muller of granite or other hard rock; when fine enough, it is placed in the horn spoon and taken to a convenient pool or stream of water, and carefully washed down in such a manner that the lighter particles flow over the edges of the spoon with the water. This operation is continued until but a small residue remains, consisting generally of pyrites, galena, and other sulphurets, iron from the mortar, and gold, if there is any in the rock. The quantity of gold is usually small, even if the quartz is rich.

Prospectors become extremely skillful in this operation, and can judge by the result what the rock may be expected to pay in a quartz mill. Some quartz is rich, in which no gold can be seen by the eye, but the use of the horn spoon reveals it with rapidity and certainty if the gold is free. Here the ability of the prospectors to judge of the nature and value of the ores they discover generally ceases, and they are compelled to call in the assistance of the assayer, if the ores contain other minerals than gold.

Prospectors of the second class seldom work the mines they discover. When prospected to a certain extent they generally seek a purchaser for their claims, which are sometimes bonded to allow the purchaser time to examine and prove them. The bond gives the control of the mine to the intended buyer for a certain time, with the privilege of purchase at a price agreed upon. In case he declines, the work done reverts to the owner. Some bonds require the payment of a forfeit in advance, while others do not. The bond amounts to a written agreement between the parties, the conditions of which vary according to circumstances.

When gold was discovered in California it was assumed that being a gold country nothing else was worth seeking. It soon began to be observed that coarse gold was found high in the foothills, while that in lower levels was in finer dust; this led to the belief in some great natural storehouse high in the snowy mountains from which the



scattered particles had strayed. It was this idea that led to the swarming of prospectors over the mountains, and the discovery of the noted gold and silver mines in this and neighboring States and Territories. It is well known that the croppings of the Comstock were first worked for gold, and that the rich black sulphurets of silver were considered an annoyance in the rockers and sluices, and for a time were thrown out as useless. It has long been known that the fineness of gold in California varies in different localities, but no special significance was attached to this circumstance until lately, when it has been noticed that gold is more alloyed with silver where mines of that metal exist, and that the discovery of silver mines may reasonably be expected where this pale gold or electrum is found on the surface. The following paper, by Henry G. Hanks and Melville Attwood, bearing on this subject, was read before the Microscopical Society of San Francisco:

PAPER ON THE OCCURRENCE OF ELECTRUM IN CALIFORNIA.

It is a well known fact that the gold in California is argentiferous. Formerly the average fineness was 885, but it is not now so high. The record of the assay of several millions of dollars worth of California gold at the Philadelphia Mint showed an average of 880, the sample lots having a range between 870 and 890.

There is a region of country, lying partly in California and partly in Nevada, in which the gold contains an unusually large quantity of silver. At Aurora, in Esmeralda County, Nevada, the gold is of this nature. During several years' mining in that locality, no true silver minerals, that could be distinguished as such, have been noticed. A blue stain in the rock has, we think, never been examined microscopically or chemically. Most of the rich rock was "peppered" with pale gold, and most of the bullion came from this source.

Many years ago a specimen of white quartz from the Jeff. Davis mine, situated near Miller-ton, in Fresno County, was exhibited, in which a quantity of very pale native gold was imbedded. One of the writers was so impressed with this discovery that he predicted the finding of silver mines in the vicinity, and has never seen any reason to change his opinion. This occurred before the Comstock was known.

A number of specimens of the vein-stones from the Bodie mines having been presented to us, and as the argentiferous gold in them appeared to be crystalline and filiform, differing in so many respects from the native alloy of the Comstock lode, although apparently of the same geological age, we were induced jointly to make a thorough examination of the interesting mineral.

We first selected, as nearly as possible, an average sample of vein-stone from each of the leading mines, and after carefully pounding them in an agate mortar, the resulting coarse powder was panned in a batea, and the gold freed from the lighter portions of the gangue; the residue was then dried and placed on a clean piece of paper, and with a needle—using at the same time a bull's-eye condenser as a magnifier—all the grains of gold, without any foreign substance adhering to them, were picked out and melted together.

We present the Society with four slides, on each of which is mounted a few grains of the argentiferous alloy. On examining slide No. 1 with a two-inch objective, it will be seen that some of the grains are white enough to be taken for native silver. But a chemical examination proves the argentiferous appearance to be superficial, for if a fragment is heated strongly, or acted on by nitric acid, or cut with a knife, it will assume the pale yellow color peculiar to the alloy.

The Bodie electrum is of a pale yellow color, resembling German silver; has a metallic luster; takes a high polish; is malleable and ductile; its hardness equals 3; it is softer than either a gold or silver American coin, being scratched by both.

Specific gravity, 15.15. Contains gold, 633.4; silver, 364.1; total, 997.5.

Electrum is well known to mineralogists, although it is rather rare—the largest mass of which we can find any record was taken from the mines of Vöröspatak, in Transylvania. It weighed twenty-five pounds, and contained twenty-five per cent. of silver.

Electrum was also well known to the ancients. Pliny, in his great work on Natural History (book 33, chapter 23), describes it as containing silver in varying proportions. "When the silver is one fifth of the ore, it is known as electrum." He also mentions an artificial electrum made by melting together gold and silver. In writing of the properties of electrum, this ancient writer states "that one peculiar advantage of electrum is its superior brilliancy to silver by lamplight." The reader, however, begins to lose confidence in his judgment when he states seriously that native electrum has the property of detecting poisons; "for, in such a case, semicircles will form on the surface of the goblet, and emit a crackling noise like that of a flame, thus giving a two-fold indication of the presence of poison."

Electrum is known from California to Cape Horn, among miners of Spanish descent, as "*oroche*," which fact would indicate that this mineral is not uncommon on the American Continent. The gold of Chili ranges in fineness from 840 to 960.

The following analyses of electrum are from Dana's Mineralogy:

	Gold.	Silver.
Barbara Transylvania.....	645.2	354.8
Vöröspatak Transylvania.....	604.9	387.4
Siranovski Altai.....	609.8	383.8
Schlangenberg Altai.....	640.0	360.0
Santa Rosa, New Granada.....	649.3	350.7

The gold of Australia is finer than that of California, the average being 925 and the range from 900 to 960.

Nova Scotia gold is nearly pure.

There seems to be a law governing the fineness of native gold in countries where mines of silver exist, and it may be reasonably expected that in localities where the gold is found to be argentiferous, silver mines may be discovered, if not already known.

The discovery of electrum in Fresno County, already mentioned, would seem to indicate that there is a silver region in California not yet discovered.

SAN FRANCISCO, January 20th, 1879.

### QUICKSILVER.

It would be almost impossible to work ores of gold and silver without quicksilver. By a wise provision of nature, that metal is found in the State in the greatest abundance. In fact, by the restless energy of the people of California, it has been over-produced and wasted.

Some effort should be made to produce mercurial preparations for export and home consumption. No serious obstacle that now appears, except perhaps high wages, would prevent the manufacture of vermilion, calomel, corrosive sublimate, and mercurial ointment, for exportation, on a large scale, with profit. Such a result will no doubt follow as the country becomes older and more settled.

The principal mines of quicksilver are enumerated in the following table, compiled from the best authority obtainable, which also shows the production of each for the year 1877, in flasks:

New Almaden.....	24,079
Redington.....	9,400
Sulphur Banks.....	11,303
Guadalupe.....	6,241
New Idria.....	6,560
Great Western.....	5,875
Altoona.....	1,417
St. Johns.....	2,000
Oceanic.....	2,628
California.....	1,490
Oakland.....	1,395
Cloverdale.....	1,300
Sunderland.....	1,200
Abbott.....	836
Manhattan.....	457
Napa Consolidated.....	2,366
Buckeye.....	466
Phoenix.....	250
Great Eastern and Jackson.....	505
Wall Street.....	100
Other sources.....	500
Total.....	80,368

## OFFICIAL REPORT

*Of the production of Quicksilver at New Almaden for twenty-seven years and three months.*

DATES.	TONS OF ORE.		Flasks of Quicksilver	Percentage Yield	No. of Months.
	Tons.	Pounds.			
July 1, 1850, to June 30, 1851	2,485	717	23,875	36.74	12
July 1, 1851, to June 30, 1852	2,321	1,290	19,921	32.82	12
July 1, 1852, to June 30, 1853	2,419	1,520	18,035	28.50	12
July 1, 1853, to June 30, 1854	3,724		26,325	27.03	12
July 1, 1854, to June 30, 1855	4,554	1,300	31,860	26.75	12
July 1, 1855, to June 30, 1856	5,177	1,200	28,083	20.74	12
July 1, 1856, to June 30, 1857	5,149	1,900	26,002	19.31	12
July 1, 1857, to June 30, 1858	5,498	1,170	29,347	20.41	12
July 1, 1858, to October 31, 1858	1,936	1,085	10,588	20.91	4
November 1, 1858, to January 31, 1861	Closed by injunction.				
February 1, 1861, to January 31, 1862	6,661	1,200	34,765	19.96	12
February 1, 1862, to January 31, 1863	7,640	1,400	40,391	20.22	12
February 1, 1863, to August 31, 1863	3,586	660	19,564	20.86	7
September 1, 1863, to October 31, 1863	1,173		5,520	18.00	2
November 1, 1863, to December 31, 1863	1,179	1,300	4,447	18.65	2
January 1, 1864, to December 31, 1864	11,638	1,600	43,489	13.96	12
January 1, 1865, to December 31, 1865	15,974	400	47,194	11.30	12
January 1, 1866, to December 31, 1866	13,442	1,300	35,150	10.00	12
January 1, 1867, to December 31, 1867	13,011	1,933	24,461	7.19	12
January 1, 1868, to December 31, 1868	14,702	1,530	25,628	6.66	12
January 1, 1869, to December 31, 1869	12,729	175	16,898	5.07	12
January 1, 1870, to December 31, 1870	10,548	1,700	14,423	5.23	12
January 1, 1871, to December 31, 1871	11,017	700	18,568	6.44	12
January 1, 1872, to December 31, 1872	10,708	600	18,574	6.63	12
January 1, 1873, to December 31, 1873	8,665	375	11,042	4.87	12
January 1, 1874, to December 31, 1874	11,727		9,084	2.96	12
January 1, 1875, to December 31, 1875	15,553	200	13,648	3.35	12
January 1, 1876, to December 31, 1876	16,658	950	20,549	4.72	12
January 1, 1877, to December 31, 1877	18,615	1,600	23,996	4.93	12
January 1, 1878, to December 31, 1878	18,472	1,808	15,852	3.28	12
January 1, 1879, to December 31, 1879	27,532	1,135	20,514	2.85	12
January 1, 1880, to November 30, 1880	28,500	450	21,403		11
December, about	2,500		1,600		1
Totals and average	315,508	1,198	699,796	9.09	339

Product of Enriqueta from 1860 to 1863, 10,571 flasks.

Total product of all the mines on the company's property, to 1880, say, 710,368 flasks of 76½ pounds each, or 54,343,152 pounds.

## IRON.

Of all the metals known to man, iron is the most generally useful. It has been said that the civilization of a country may be measured by the quantity of iron produced and consumed. While iron is the most useful of metals, it is at the same time the most widely distributed. Although seldom found in a metallic state in nature, it seems to permeate the earth's crust, and appears in many forms. It is one of the constituents of the granites which are considered to be almost the foundation of the earth. It is more abundant as an ingredient in the volcanic rocks, and still more so in mountain masses, beds, stratified deposits, eruptive masses, etc., at many localities on the surface of the earth. It is found in mineral waters, and it circulates in solution in the veins and tissues of plants and animals. Native iron being extremely rare, being almost wholly, as far as

known, of meteoric origin, we must look to the ores of that metal for our material. These ores occur in rocks of all ages, and are abundant in California at a number of known localities. There are two distinct classes of iron ores that are sought by the smelter: those known as *spathic*, the most important of which is *siderite* or *carbonate of iron*, and the oxidized ores known as *magnetite*, *hematite*, and *limonite*. The latter are the most common in the State. Iron occurs in other forms, combined to a greater or less extent with other substances and metals, as *franklinite*, *pyrites*, *titaniferous iron*, *chrome-iron*, *magnetic sands*, etc., which have their uses in the arts, but which are not suitable for the production of the metal.

Long ages passed after man appeared on the earth before the use of iron was discovered. That metal has so strong an affinity for oxygen that it does not long remain in a metallic state, and there is nothing in the appearance of the rusty looking oxides that would indicate to the uneducated mind that a valuable metal could be extracted from them. The progress was gradual, as shown by the study of primitive man—from the use of rude stone implements to those of polished stone, then to the era of bronze and copper, followed in comparatively modern times by the use of iron. There can be no doubt that gold and copper were in common use long before iron was known. When that metal was first introduced it was no doubt far more precious than gold. It represented excessive labor, while gold and copper were found in a metallic state, and were easily wrought. The relative value of these metals in early times is illustrated by swords and knives of gold, the edges only being of iron, found in ancient mounds in Denmark, with older implements of the stone age, now preserved in the Museum of Copenhagen.

Manifold are the uses to which iron may be put, from the construction of the hull of a war ship to the tiniest screw in a lady's watch. It can be rolled into sheets as thin as paper, drawn into the finest wire, twisted and woven, rolled into bars that can be tied into knots without breaking. It can be forged and welded, turned into desired shapes in lathes. It takes the polish of a mirror, and it can be melted like water, and cast in quantities weighing many tons. Its salts, and compounds with other substances, have many uses in the arts; that of war is almost dependent upon iron, which has led to the naming many of its salts after Mars, the war god of the ancients. In short, this metal has become almost indispensable to mankind.

There are three kinds of iron in common use: crude cast or pig iron, malleable or bar iron, and steel. The different states of the iron depend principally on the quantity of carbon they contain. Cast iron has the most, and bar iron the least. All iron was formerly smelted by the heat generated by the combustion of wood charcoal. In sixteen hundred and eleven it was discovered that mineral or pit coal could be substituted for charcoal, which revolutionized the iron manufacture. It was not, however, successfully used until one hundred and twenty-four years later. In fifteen hundred and eighty-four the attention of the British Government was called to the threatened destruction of the forests by the use of the wood for making charcoal for iron furnaces. An Act of Parliament was passed, restricting the use of wood for that purpose.

In countries where forest trees are abundant, charcoal is still extensively used for the production of crude iron. In California, for

the time being, this fuel must be used, unless our extensive deposits of petroleum can be utilized for that purpose. In early times, rude and temporary furnaces were used for smelting, but in modern days they have been improved until they have become models of human ingenuity and skill. They now represent large capital. They are costly and complex, and, at the same time, nearly perfect in all their parts, the result of consecutive years of experience and study.

As molten iron comes from the blast furnace, it is formed into rude ingots known as "*pigs*" or "*pig iron*." In this state it is very hard and impure, and can be put only to limited use. To render it malleable is to purify it of certain objectionable substances, such as sulphur, phosphorus, and, more specially, carbon. This is effected by a process called "*puddling*," by which nearly all the carbon is oxidized. For this purpose a peculiar furnace is used, called, from the operation, a "*puddling furnace*," in which the crude iron is subjected to the action of heat, and a blast of atmospheric air so managed that the impurities are eliminated, and by a system of stirring, which is very laborious, the soft iron is aggregated into "*puddle balls*," which are, while in a semi-molten state, hammered, squeezed, or rolled by heavy machinery until the purified metal becomes homogeneous, and is ready to be drawn into bars or rolled into sheets, as may be required.

In view of the importance to California of a supply of cheap iron of home production, as it is desirable that many idle hands should be employed, and that money sent abroad for what could well be produced in the State, should be retained in the land to circulate among our citizens and impart new life to our waning prosperity, it is interesting to know that at least one of the iron deposits of the State is to be developed, and the question solved as to whether labor and capital in California can and will coöperate to their mutual advantage, and thus institute important iron interests leading to other industries and manufactures, without which the State must recede rather than advance in prosperity and importance.

The deposit alluded to is in Placer County, near Clipper Gap. The property is in the hands of some of California's most enterprising citizens, and what is very important in a work of such magnitude, is backed by ample capital. The furnace and charcoal ovens were nearly complete when visited by the State Mineralogist in October. The furnace is constructed on the most modern and approved plans. No expense has been spared to make it as complete and perfect as possible. It is due to the State Geological Survey, conducted by Professor Whitney, to state here that the information which led to this important result is given in the volume on Geology, folio 284, in the following words:

The ore crops out on a hillside and forms a mass more than thirty feet thick, of which the longitudinal extent is not known, although it is evidently considerable. It is hematite, perhaps mixed with some limonite, and has not yet been analyzed. It appears, however, to be of excellent quality, and is remarkably pure and free from intermixture with rock. With the present prices of fuel and labor, it is not easy to say how soon California will be able to manufacture her own iron; but this locality is perhaps more favorably situated than any yet discovered in the State for trying the experiment.

This statement, published fifteen years ago, attracted the attention of a gentleman identified with the iron interests, and led to the enterprise above mentioned.

Samples of ores, limestones, fire clays, and other products have been

sent to the State Museum. Analyses of some of the iron ores and limestones will be found in the report of the Chemist.

#### SALT.

The discovery of salt springs in California may lead to important industries connected with the production and consumption of that very useful mineral. While the State Mineralogist was examining the limestone and marble deposits in Placer County, he was informed of two springs, the waters of which were salt, and although they had been known for many years, no special importance had been attached to them. The information was given too late to admit of one being examined, situated on section thirty, township thirteen north, and range nine east, but a sample was obtained from the other—north-west quarter of section fifteen, township thirteen north, and range eight east, Mount Diablo meridian, an analysis of which, made in the laboratory of the Mining Bureau, has proved to be very interesting.

The water is strongly calcareous. It is filled with mechanical impurity, and has a distinct saline taste. A drop evaporated on a glass slide, under the microscope shows an abundance of characteristic hopper-shaped crystals of salt. An analysis was made from the filtered water, and the amount of salt contained was found to be 1143.6 parts in 100,000. The full analysis is not given here, for the reason that the water was taken from the spring without special care, and can hardly be supposed to be a fair sample. The localities mentioned will be carefully studied, and the results published in full.

It is highly probable that a well sunk at this locality would develop a valuable supply of brine—at all events it is worthy of the experiment. The strength of the water, as shown by analysis, falls far short of that of deep salt wells sunk artificially. But this might be expected, as in its passage upward from an unknown depth, it would be likely to become diluted with fresh surface water. The profitable production of salt from this source is a question of labor, fuel, and transportation. If a brine can be found, by sinking, that may be crystallized and delivered at a market with profit, the work will be continued, otherwise one of two things will follow: either greater economy will be studied and practiced, both in fuel and labor, or the work will be abandoned, to be resumed when conditions are more favorable. Salt is already manufactured in the State, generally from sea water, and it may be that at the present time this new source cannot compete with the old; yet in New York, which also has a seacoast, the salt wells of the interior counties have been worked with profit for many years, and will, no doubt, continue to be for many to come.

The following figures, from the geological surveys of that State, will show the importance of this industry: At the Onondaga Salt Works alone, the quantity of salt inspected in sixteen years, from eighteen hundred and twenty-six to eighteen hundred and forty-one, inclusive, was 30,127,837 bushels. In eighteen hundred and sixty-two the salt production of the State was 9,053,847 bushels, and the annual average since that date is estimated at 8,000,000 bushels. The State claims all the salines and leases them, collecting a royalty of one cent on each bushel of salt produced. A State Inspector is appointed, whose duty it is to report the product and to stamp on the packages the quality.

Extensive salt works are in operation in West Virginia, Kentucky, Michigan, Indiana, Missouri, Pennsylvania, and other States. In Michigan, attempts made to utilize the salt springs were at first unsuccessful; so important, however, was the matter considered, that the Legislature offered a premium of ten cents per bushel on all salt produced in the State. Michigan is now second only to New York in the production of salt.

There are three different methods of manufacture, as practiced in New York and other salt-producing States: First, boiling in kettles; second, solar evaporation; and third, evaporation in shallow pans by artificial heat. In the first method the kettles are of iron of a capacity of one hundred gallons, set in brickwork in such a manner that one furnace supplies heat to a number. The kettles are filled with brine, which is kept in a state of violent ebullition. Lime salts first form, which are removed from time to time with suitable ladles, and the operation continued until the resulting salt is nearly dry, when it is removed, drained from the mother liquor, and fully dried. Solar evaporation is effected in shallow wooden vats, built in pairs, one on a higher level than the other. The brine is conducted from the wells to the upper set through wooden pipes, where it remains exposed to the heat of the sun until some of the foreign matters fall, when it is drawn off into the lower set in which the salt, now comparatively pure, crystallizes out. By the third method the brines are evaporated in shallow iron pans, heated either by an open fire or by steam coils.

There are many ways of economizing in the manufacture of salt, the result of the experience of those engaged in its manufacture, in our own country and elsewhere, which would not immediately occur to those new in the business, such as pumping brines by windmills, and partly condensing by the action of a current of air, by which method the brines are pumped to a certain level and caused to fall in showers on faggots of small branches, by which the liquid is broken and divided in contact with the air, becoming rapidly and economically concentrated.

Salt wells are very stable in their nature. One in New York has been pumped for more than forty years without the strength of the brines decreasing.

#### TIN

Is comparatively a rare metal—it was used in prehistoric ages. It is supposed the ancient people obtained their supply from the Cornish mines. In later times the same mines were worked by Augustus, the Roman Emperor, and they are not yet exhausted. The island of Banca also produces tin in very large quantities, and it is well known that Mexico has deposits likely to be opened to the world at any time. The mines of Banca were discovered in the year seventeen hundred and ninety-nine. This metal was found in Victoria, Australia, in eighteen hundred and fifty-three, by the Rev. W. B. Clarke, a celebrated Australian geologist. It was afterwards discovered in New South Wales, in the New England Pastoral District, and still later in Queensland. Mr. J. Gregory reported to the Queensland Government that having measured one hundred and seventy miles of creeks and river beds, he found, on calculating the value as carefully as possible, of the stream tin alone, without estimating the veins known to exist, that it amounted to the large sum of 13,000,000.

pounds sterling. At the Paris Exposition of eighteen hundred and seventy-eight the colonies of New South Wales and Queensland had on exhibition piles of tin bars laid up like cordwood.

The following table of tin ore and metallic tin exported from Victoria during five years, will show the magnitude of this interest:

1870 -----	237,294
1871 -----	255,891
1872 -----	282,105
1873 -----	305,886
1874 -----	325,847
Total, pounds sterling -----	1,407,023

It is well known that veins of rich tin ore exist in San Bernardino County, in this State. Although tin may have been over produced in Australia, it does not follow that the valuable deposits in our own State should not be turned to account.

#### CHROMIC IRON

Abounds in California. It has been exported in the crude state in large quantities for consumption abroad. It is purchased by those whose interest it is to obtain it at the lowest possible price. This mineral is becoming scarce at other localities, and the world must look to a great extent to our State for its supply. While we gain some revenue from the shipment of the crude mineral, the State would be still more benefited if some of our idle men were employed in its manufacture. It will not of course pay to import potash salts at the present time to combine with it, and again pay freight to a market, but there seems to be no reason why the chromates of lime, and lead, and the sesquioxide of chromium, may not be produced to advantage in California.

#### BUILDING MATERIALS.

It has been wisely said that "time seldom spares what it does not take time to create." While the necessity of improvising a new city from the materials at hand, in certain cases, is admitted, it is equally true that such a policy long continued would be unwise in the extreme.

When an intelligent person walks through the streets of our principal city and sees the wretched condition of the sidewalks and the makeshift houses rapidly falling into decay, he must be impressed with the thought that the time has come for a radical change in the manner of building, in the materials used, and in the care and management of the streets themselves. There are encouraging indications of the dawn of a new era, the flimsily built short lived wooden shells, although elegant and even architectural and grand in appearance both inwardly and outwardly, rendered so by a profusion of redwood carving and paint, will not much longer satisfy the people of California. Did not the good sense of our citizens cause them to realize the costly mistakes made in building, the change referred to must still come sooner or later, as the forests of California are being destroyed in the most extravagant and wasteful manner. Those causing this wholesale destruction seem to have wholly lost sight of the fact that while it takes but a few hours at



most to fell the largest tree, nature expended many years in producing it, and the same time must elapse, all conditions being equal, before it can be replaced. It has been said, in illustration of the extravagant ways of our people, that a Californian in want of a pick handle will cut down a noble tree that would furnish many cords of wood or yield sufficient lumber to build a large house, and having satisfied the demand for the pick handle, will leave the fallen tree to decay without a regret.

In most countries special officers or commissioners are appointed, whose duty it is to collect statistics of the forest lands, and to give information as to the best plan to utilize the timber without waste, and to encourage the planting of trees. The United States has not been backward in this duty. The Agricultural Department has given much attention to the very important subject, and has warned the people of the different States of the evil of thus thoughtlessly destroying the forest trees. The State Legislature of California has enacted laws aiming to abate this abuse, but has not, perhaps, attached sufficient importance to the subject. R. W. Raymond, in his report on mines and mining for eighteen hundred and seventy, calls special attention to the waste of timber on the Pacific Coast. There really seems to be danger of a wood famine within a few years, unless other building materials are substituted for lumber, and a larger supply of coal is discovered.

In view of the danger of fire that menaces our wooden cities, it is worth while to turn our attention to fireproof materials with which to rebuild the cheap and ephemeral structures, or to replace those which will certainly be swept away like tinder when circumstances combine to kindle an unusual conflagration. It is not only possible but easy to construct absolutely fireproof buildings, and the materials are plentiful in the State.

The natural building stones of the State may be classified as granites, syenites, diorites, porphyries, sandstones, limestones, marbles, serpentines, alabaster, etc., in many varieties of color, texture, strength, and durability. It will be the duty of the Bureau to collect these from all parts of the State, and to make such physical and chemical examinations as will prove their usefulness for building purposes.

Artificial stones have been manufactured to some extent in California, several of our finest buildings having been built wholly, or in part, of them. In our peculiar mild climate they will, in all probability, prove a durable and convenient building material. The mineral substances of which they are constructed may, in most cases, be found in the State.

Concrete is a cheap and very convenient material for the construction of a certain class of buildings, and for portions of others. In preparing concrete, natural sandstone is imitated. Like artificial stones, there are a number of formulæ for mixing the composition; but the chief ingredients are sand, gravel, lime, and cement. The celebrated French "*béton*" is simply lime and sand, in such proportions, and so mixed, that only the interstices between the sand grains are filled with the lime. When carefully and properly prepared it is durable and useful, and should have a more general application in California.

Cement, claimed to be equal to any made elsewhere, is now manu-

factured in California. This material is used in concretes and mortars, in artificial stones, pavements, sewer pipes, tiles, and in other ways. It is almost indispensable in the construction of first class buildings, and the modes of its application are likely to be multiplied.

Plaster of Paris is quite largely manufactured in the State, but as yet from foreign material. The method of preparing plaster of Paris is to pulverize the natural hydrated sulphate of lime (gypsum), and to heat it in iron kettles until the water of composition is driven off, when it acquires the property of reabsorbing water and becoming again hard and solid. When calcined with alum it makes a harder cement, known as "Keene's cement;" when borax is substituted for alum it becomes "Parian," and with pearlash "Martins." Stucco is plaster of Paris mixed with weak glue. It has many useful applications in building. Plaster of Paris variously colored is extensively used for imitations of marbles and other ornamental stones. It is also used for filling in between floors, for finish of interior walls under the name of "hard finish," and has many minor uses. It is also valuable in its natural state as a manure. A number of deposits of this mineral are known in the State, some of which have been recently discovered, and it is to be hoped that our own material will soon replace the foreign.

Floating Bricks. Among the most useful and convenient building materials are well burned bricks. The want of bricks for the construction of light masonry has led to a number of inventions, among the most prominent of which is the "Jules Borie's hollow brick," described in detail in the Mining and Scientific Press of July twenty-second, eighteen hundred and seventy-six. In the Italian department of the Paris Exposition of eighteen hundred and seventy-eight, floating bricks were shown, made of diatomaceous earth mixed with a small quantity of clay. These fulfill all the requirements of common bricks, yet they are so light as to float on the water like cork. They are fireproof, possess great strength, and power to resist crushing force quite sufficient to render them suitable for the construction of walls, filling in floors, for furnaces, and for nearly all purposes for which ordinary bricks are used. The Italian floating bricks have many advantages over the above mentioned inventions. The idea of light bricks is not new. Pliny, in his work on Natural History, Book 35, Chapter 49, writes: "At Pitane, in Asia, and in the cities of Maxilua and Calentum, in farther Spain, there are bricks which float in the water when dry, the materials being a sort of pumice earth, extremely good for the purpose, when it can be made to unite." For some reason the art was lost. According to Ure's Dictionary, M. Fabbroni made a series of experiments to ascertain the nature of the material used by the ancients. He found that a natural substance called "fossil meal," which is another name for diatomaceous earth, would produce bricks similar in every respect to the ancient manufacture. This earth is plentiful in Tuscany. It is also found in the territories of Sienna, and it is abundant in California. Bricks of diatomaceous earth, mixed with one twentieth of clay, resist water, unite perfectly with lime, suffer no alteration from heat or cold, their strength is nearly equal to that of common brick, and is much greater in proportion to their weight. M. Fabbroni found that a floating brick seven inches long, four and one half broad, and one inch and seven lines in thickness, weighed only fourteen and one half ounces, while a common brick weighed

five pounds six and three quarters ounces. The fireproof nature of these bricks may be realized when we find it stated that one end can be held in the hand, without inconvenience, while the other is red hot. To test the quality of California materials, Messrs. Gladding, McBean & Co. have made a specimen brick from Placer County clay and Monterey diatomaceous earth, which has been placed in the State Museum, and which seems to be in every way equal to those shown at the Paris Exposition. Common brick of the best quality, both pressed and otherwise, are made in California, and clay suitable for their manufacture is found at many localities in the State.

Asphaltum as a building material is useful in a number of ways, for floors, roofs, etc., applied hot and in a semi-liquid state; made into tiles and paving blocks, formed into pipe for water and sewage; when dissolved in turpentine as a paint or varnish which is tough and durable, and specially suited for the protection of iron from rust. It occurs in quantity in some of the southern counties, notably, Santa Clara, San Luis Obispo, Santa Barbara, Los Angeles, and San Diego. At the Los Angeles locality the liquid bitumen oozes from the shales and shaly limestones, while at most other known localities the action has either ceased or is hidden beneath the indurated overflow. Asphaltum from California localities is not only used to considerable extent in the larger cities of the State, but inquiries have been made from abroad with a view to its exportation. The following is the result of a mechanical analysis of a sample from Santa Barbara County: Specific gravity, 1.30; bitumen-volatile portion, 35; bitumen fixed portion, 7.2; quartz sand, 57.8—100.

It melts at a low temperature, at a higher heat it burns with a yellow flame and a dense black smoke. All the bituminous matter is soluble in ether and in spirits of turpentine, forming the excellent black varnish before mentioned; under the microscope the insoluble portion or residue is seen to be ordinary sand of the desert, and is no doubt blown over the thickening bitumen that flows from a subterranean source and is absorbed. It is evidently a mechanical mixture formed after the liquid asphalt exudes from the ground. In San Francisco asphaltum is heated in large kettles, gravel or sand added, and generally a certain portion of coal tar. There seems to be no system or rule by which the quantity of foreign substances is added. In France the manipulation is brought to a science. There are two kinds of asphalt used in France, one a natural rock and the other an artificial preparation called "mastic of asphalt," both of which are extensively applied to roads and for building purposes. The natural rock is a limestone which is impregnated with bitumen, the specific gravity of which is 2.23. The composition of this rock is from seven to eight per cent. of bitumen to ninety-two to ninety-three per cent. of limestone. This rock has the property of falling into a powder at a temperature of one hundred and eighty degrees, in which state it is used in construction. It is first laid loosely where required, tamped lightly, and then smoothed with a hot iron. If powdered limestone should be added to our asphaltum until the above proportions were obtained, it might be used in the same manner, which is very convenient. It will be seen by comparing the above figures that California asphaltum is much richer than French. One ton of ours would make more than five of theirs. If experiments were made, some important improvements would follow, and the usefulness of the article greatly increased. In view of the fact that

asphaltum is yearly being more extensively used in building, these deposits promise to be of great value, and will add materially to the resources of the State.

Lime, so generally useful, not only for building, but for many other purposes, is now wholly manufactured in the State. The supply is unlimited. Some of the quarries that furnish the limestone to the kilns, yield also marbles, which, either in the rough, or cut and polished, are well suited for building purposes. At one locality in Placer County is found a beautiful white marble, some of which has been sent to San Francisco to be used for the production of carbonic acid in the manufacture of artificial mineral waters. It is the intention in a future report to give a full description of these deposits, and to publish statistics of the lime interests of the State, with such analysis as may be considered of general interest.

Iron is used in construction, not only as a durable and ornamental exterior, but for girders, posts, store fronts, cornices, caps and sills of doors and windows, and as nails, screws, brads, locks, hinges, etc. It has already been stated that the ores of this metal are abundant in California.

Glass is an artificial silicate of soda or potash, to which other substances are added, all of them mineral, to produce varieties of quality, color, or appearance. The following are the most important: Lead, bismuth, zinc, iron, manganese, copper, uranium, gold, tin, antimony, chromium, alumina, silver, cobalt, borax, strontia, baryta, fluor spar, and cryolite. The foundation of glass is silica, generally supplied in the form of quartz sand, but sometimes quartz rocks, flint, etc., are pulverized for that purpose. The tailings of some of our quartz mills are nearly pure silica; if not wholly free from metallic impurities they could probably be rendered so by careful washing. The more common varieties of glass are already manufactured in California, which will doubtless increase until the home demand is supplied. It has been difficult to obtain sand on the Pacific Coast for the finer manufacture of glass, that is, fully up to the requirements of the glassmaker. This difficulty will probably disappear when more careful trials are made of the beautiful white sands of the State, without the prejudice that seems to warp the judgment of workmen accustomed to the use of material from a particular locality, and who are inclined to attribute any fault in the product to the new.

Tile stones are natural slabs of sandstone or other sedimentary rocks, useful for cellar floors, coping of brick walls, tops of parapets, etc. Some samples may be seen in the State Museum, from Oil Creek, San Luis Obispo County, and others from a locality near Clipper Gap, in Placer County. Other localities will no doubt be found when wanted.

Roofing Slates. When fireproof buildings become the rule in our cities, slates will be required—and it is a satisfaction to know that it will not be necessary to send out of the State for a supply.

#### CLAY DEPOSITS OF THE STATE.

The matter of the clay deposits of the State is too important to be put off with a general notice. It will be the duty of the State Mineralogist to thoroughly investigate the known deposits, and to publish all information that can be obtained relating to them and to

their manufacture. Samples from various sources may be seen in the State Museum, with some of the wares, useful and ornamental, of California manufacture. It is to be hoped in the future that more numerous samples, both of the crude clays and their products, will be added to the collection. This material is quite extensively used in building in California, as sewer-pipes, tiles, chimney-tops, fire-brick, and also manufactured into many useful forms. A few analyses have been made, which are given below:

*Analysis of Clay from a deposit at Lincoln, Placer County.*

MECHANICAL ANALYSIS.	
Coarse sand .....	10.36
Fine sand .....	10.76
Combined water .....	10.60
Hygroscopic water .....	1.00
Pure clay .....	67.28
	<hr/> 100.00
CHEMICAL ANALYSIS.	
Silica .....	41.80
Alumina .....	38.78
Combined water .....	6.00
Hygroscopic water .....	1.62
Carbonate of lime .....	2.64
Magnesia .....	1.02
Soda .....	3.46
Sesquioxide of iron .....	2.12
Loss .....	2.56
	<hr/> 100.00

The above sample is known to the potters as "White Non-plastic Clay."

*Analysis of a sample of Clay, from the same locality, known as "Blue Plastic Clay."*

MECHANICAL ANALYSIS.	
Coarse sand .....	3.30
Fine sand .....	28.52
Combined water .....	10.80
Hygroscopic water .....	.80
Pure clay .....	56.58
	<hr/> 100.00
CHEMICAL ANALYSIS.	
Silica .....	44.82
Alumina .....	34.54
Combined water .....	8.37
Hygroscopic water .....	1.27
Carbonate of lime .....	3.00
Magnesia .....	.96
Soda .....	4.74
Sesquioxide of iron .....	1.86
Loss .....	.44
	<hr/> 100.00

*Mechanical Analysis of Clay from Cook's Ranch, near Lincoln, Placer County.*

Coarse sand .....	5.30
Fine sand .....	3.77
Hygroscopic water .....	4.70
Pure clay .....	86.23
	<hr/> 100.00

This clay was almost free from iron, and was very plastic and tenacious; it had a strong argillaceous smell, and when baked was very refractory. The sand washed out was nearly pure silica, which for coarse ware or for fireproof material is not objectionable.

#### PLATINUM.

The platinum minerals are found in considerable quantity on the Pacific Coast. If the miners could be persuaded to collect them, an industry might be established of considerable importance. There is no reason why platinum should not be manufactured in San Francisco, and the American demand in part or wholly supplied by this State. The process of manufacture is simple, the plant required inexpensive, and there are skillful chemists in the State fully competent to manage it. The control of the platinum trade is in the hands of a single English manufacturing firm, which has been the case for many years.

#### BUHR MILLSTONE.

This valuable mineral has been found at several localities in the State; one examined by the State Mineralogist a number of years ago is a small outlier in Owen's River Valley, Inyo County, known as "Little Butte," which is a prominent landmark on the line dividing Russ from Inyo mining districts. It lies partly on section thirteen, township thirteen south, and range thirty-five east; and partly on section eighteen, same township, range thirty-six east. The stone is hard and brecciated, somewhat resembling the celebrated French buhr stone. A sample has been placed in the State Museum. Dr. J. B. Trask, first State Geologist of California, says in his first report, that it is found in great abundance on Pit River—now Modoc County—extending to the north of Goose Lake. The following quotation shows what importance he attached to the discovery:

Its admirable adaptation to milling requires no comment. The value of this rock cannot be too highly esteemed in this State, where the prospective is so flattering of its becoming a grain growing country equaled by few on the Atlantic slope. The heavy expenses that are now incurred, and the future wants of the State in this particular, will be obviated, and our dependent condition on foreign import destroyed. These rocks have as yet attracted little notice, but the rapidly increasing wants of the State will ere long bring them into requisition.

#### LOW GRADE ORES.

The day for sudden and enormous yield of gold and silver has in a measure passed, and it is reasonable to anticipate a cooling down of the mining excitement caused by the extraordinary development of the great Comstock vein. Our State must fall back on the legitimate business of careful and economical mining. The experience of other countries has been that mines producing large quantities of low grade ores are more reliable than those yielding a small quantity of high grade, the former proving the best investment. We have been accustomed, in our prosperity, to regard low grade ores with disfavor, but the day will surely come when we must look to them for our supplies. This being admitted, it is a satisfaction to know that the supply in the State is practically unlimited. As an example of what may be expected of the mines of the future, the Rio Tinto mine, of Spain, may be cited. Although this celebrated

mine has been worked at intervals for centuries, and large capital is now invested, at last accounts ores were being worked with profit containing only two per cent. of copper, and others yielding but fourteen pennyweights of silver to the ton.

#### BLACK SANDS FROM HYDRAULIC AND PLACER MINES.

The tailings from hydraulic and placer mines are an interesting study. It has been difficult to separate the gold from them in many cases, and various theories have been advanced as to the cause. The difficulty seems to be mechanical; the magnetic residue is so nearly of the same specific gravity as the gold that the precious metal is lost by the mechanical force of the water used in concentration. Some of the gold is coated with foreign matters which prevent amalgamation. The following paper on this subject was read before the San Francisco Microscopical Society, at a recent meeting:

#### RUSTY GOLD,

Is a term applied to placer gold which escapes amalgamation in hydraulic and sluice washing. For many years it has been a common belief among miners that a large proportion of gold passes through the sluices, under-currents, grizzlies, tail-races, and other appliances—coming repeatedly in contact with quicksilver without being arrested by it—and finally escapes. By others, this has been held to be a mistake, and what was believed to be gold, covered with rust, was, in reality, something else. I must admit that I never had much faith in the theory of rusty gold, as I have repeatedly examined samples, claimed to be in that state, which failed to show any abnormal condition. Most of the samples sent to me were from quartz; in all of which cases I found the gold to amalgamate without difficulty. Within a few months I have had my attention called to some placer gold, which has made me a convert to the opinion so often expressed by the miners. I have brought samples this evening for your inspection. They were furnished by Mr. Charles W. Banks, Corresponding Secretary of this society. They are from a large deposit of Feather River tailings, at a locality below Oroville, in Butte County. The following is the result of a chemical and mechanical examination of this interesting material: Under the microscope, the particles have a dark brown color, showing, in some cases, nearly white silica, in irregular, imbedded fragments, forming a compound cement; having, when magnified, the appearance of a conglomerate or breccia. Some of the samples were wholly coated, others only partially so. In some cases the coating was perfectly opaque, hiding the gold from sight, while in others it was semi-transparent, through which the gold was plainly discernible. Placed in mercury, those pieces wholly coated were not acted on; those only partially so, became amalgamated to the extent to which the gold was unprotected. The coating was found to be brittle. When the pieces were turned on their edges and struck lightly with a small hammer, the coating scaled off, leaving the gold bright and clean; after which it amalgamated without difficulty. On boiling some of the rusty gold in hydrochloric acid, the coating was decomposed, silica separating, the acid acquiring a golden yellow color, and giving a strong reaction for iron. The gold was left clean and bright. Six of the particles, boiled in hydrochloric acid, and weighed before and after, in milligrammes, gave the following result:

	Before.	After.	Loss.	Per Cent.
No. 1.....	126.5	15.0	1.5	1.18
No. 2.....	28.0	26.5	1.5	5.30
No. 3.....	40.0	35.8	4.2	10.50
No. 4.....	25.1	22.3	2.8	11.20
No. 5.....	18.3	16.8	1.5	8.30
No. 6.....	33.4	32.7	0.7	2.10

Average percentage of the coating by weight, 6.43.

Mr. George Attwood, son of Melville Attwood, of this society, read a very interesting paper on this subject in July of last year, before the Chemical Society of London. The specimen, or nugget, upon which his experiments were made, was much larger than those I have described—so much so, that the microscope was not required to study the ferruginous coating. This coated gold was obtained personally by Mr. Attwood from the State of Guayana, Venezuela, South America. From the fact that Mr. Attwood found finely divided gold disseminated through the

coating, and attached to the surface of the larger nugget, he came to the conclusion that gold nuggets grow larger from external causes. The following are his own words:

"In conclusion, from the above experiments, made and recorded, on a gold nugget, covered with a glazed ferruginous earth, it would appear to me to prove that gold nuggets do gradually increase in size, owing to the accumulation of fresh particles of freshly precipitated gold."

I am not prepared to venture any theories at the present time, but desire to continue my investigations, with the hope that they may throw some light on this very interesting subject; and as the miners of the Pacific Coast are more directly interested than I am, I do not think it too much to ask them to send, to the Corresponding Secretary of the San Francisco Microscopical Society, small samples of gold for examination, with the promise that the results shall be made public, through the publications of the society.

### *Mechanical Analysis of a typical sample of California Black Sand.*

No. 1, gold separated by amalgamation, and weighed; No. 2, magnetic portion separated by the magnet; No. 3, sand separated by Schultz's apparatus. The remaining portion, No. 4, was dried and weighed, and the sand, No. 3, estimated by loss. At a high temperature, a large portion of this residue became magnetic, and was found to have gained 0.42 per cent. in weight. In heating it decrepitated and became somewhat darker in color. The magnetic portion was removed by the magnet, and the remainder, No. 5, consisting of microscopic crystals and metallic grains was weighed. The percentage of constituents with specific gravity was found to be as follows:

	Percentage.	Specific Gravity.
No. 1, gold .....	.0003	-----
No. 2, magnetic portion .....	16.8125	4.841
No. 3, sand .....	40.7872	3.185
No. 4, magnetic by heating .....	23.1504	4.694
No. 5, residue .....	19.2496	4.557
	100.0000	

The gold, No. 1, was of good color; it amalgamated readily, but the amount was too small to examine critically. No. 2 was a homogeneous black powder, highly magnetic; under the microscope it was found to be rounded masses of a black color, and semi-metallic luster. Some of the particles showed signs of crystallization, but the angles were too much worn to identify. Some well marked octahedrons were observed. Some of the particles had a cellular appearance, in which the cavities were well marked. When ground in an agate mortar, the powder was black; it was infusible alone, gave a greenish glass with borax, was partly soluble in nitro-hydrochloric acid, and was decomposed by fusion with alkaline carbonates, the residue being wholly soluble in hydrochloric acid. No. 3 was the ordinary ocean beach sand, consisting mostly of white and yellowish quartz, with some dark colored particles. No. 4 resembled No. 2 physically, in nearly every particular. No. 5 was by far the most interesting, consisting, for the most part, of microscopic crystals of great beauty, and partly of metallic particles, non-magnetic. Some of the crystals were of a pale yellow color, others were white and red. The red ones were rounded and worn so as to render their crystalline form doubtful. The white and straw colored crystals were perfect on the edges—as well defined as if freshly crystallized from solution. Their hardness may be inferred when it is remembered that all the other particles were rounded; and their specific gravity,



from the fact that they could not be removed by the water in Schultz's apparatus without taking over metallic particles; although they had been subjected to a high temperature, the luster of the crystals had not been impaired.

*Examination of Sand from Capella, Mendocino County.*

Coarse portion (A) which remained on 60-mesh sieve, black, shining, homogeneous rounded globular masses, with a few pieces of quartz, and some octahedrons, a few red dodecahedral crystals; the largest piece resembled obsidian -----	22.255 per cent.
Magnetic portion (B) generally dull, some splendid crystals, like the Elba magnetic; a few quartz particles lifted mechanically -----	5.600 per cent.
Water (C) -----	0.800 per cent.
Fine sand (D), from which water, coarse portion, and magnetic were removed -----	71.345 per cent.
	<hr/> 100.000

The portion (D), consisting, as it does, of zircons, white and yellow quartz, black, non-magnetic particles, and splendid red crystals, the nature of which is doubtful, is an interesting study under the microscope. After removing the magnetic portion (B), the residue was heated to strong redness and again tested with the magnet, but none of the constituents of the sand had become magnetic; when examined again under the microscope it was seen to have remained unchanged, the zircons and red crystals retaining their remarkable brilliancy.

The percentage of constituents was obtained by counting under the microscope, and the mean of several readings taken. The result was as follows:

Zircons -----	26
Black sand -----	52
Quartz -----	20
Red crystals -----	2
	<hr/> 100

ALKALINE LAKES.

Attention should be given to the alkaline lakes of the State, which contain great stores of chemical salts in solution, which in all probability can be made to furnish large quantities of useful products by simple pumping and evaporation by solar heat. The most important are of Mono and Owen's. Careful examinations of these in particular are planned for the succeeding year. Full analysis will be made of the waters for publication.

EXTENSIVE METALLURGICAL WORKS REQUIRED.

Now that reasoning men begin to regard mining as a legitimate field for the investment of capital, it is well to consider the past, and to utilize experience so dearly bought. If we do so we shall find that we have made many costly mistakes; perhaps the most disastrous has been the premature erection of mills. It is deplorable to see the expensive and finely finished machinery lying useless in many parts of the State. There are but few mines that can be expected to pay on the surface. All should be proved by deep prospecting, and much cool judgment exercised before a mill is built. This mistake is too

often made in the haste to satisfy stockholders who demand immediate returns for the money invested, or to inflate stocks and give to them a fictitious value. Experience has shown that few mines will warrant the erection of extensive metallurgical works of any kind. It is well known that mineral veins change their character frequently, as depth is attained upon them. For these and other important reasons ores of a complex character should be bought and sold like wheat or other produce, after dressing and concentration—the value to be determined by assay and the price left to competition.

If there could be more large metallurgical works near San Francisco, Sacramento, Los Angeles, and other central points, to which transportation is cheap, a demand for such ores would grow up which would be of great importance to the State. At these works all the various substances in the ores would be utilized, the sulphur saved as such, or made directly into sulphuric acid, to be employed at the same works in various metallurgical operations. The arsenic, copper, lead, bismuth, antimony, zinc, etc., could be extracted, even though present in small quantities. After the pyrites, which is the *bete noir* of the quartz miners, had been treated with chlorine, after utilizing the sulphur; the oxide of iron now generally wasted, could be treated with the surplus acid and made into sulphate of iron, which has many uses, or manufactured by a cheap and simple process into an excellent pigment; the copper present could be recovered as metal or changed into blue-stone. There is no more reason why every mine owner should work his own ores, except in case of free gold, than that the farmer should turn his wheat into flour and bake it all into bread.

There are mines which, under this system, would pay for years to small operators who, selling their ores, would have capital to work their mines on a larger scale, while mines more doubtful might by this plan be so developed as to become worthy of the investment of capital.

One of the first things that attracts the attention of visitors to the great metallurgical works of Swansea, is the cheap and unpretentious buildings which cover the works, and the economy with which the old material, as fire-bricks, flues, grate-bars, etc., are used over and over again, as long as any wear can be obtained from them. Everything is utilized, and the most painstaking economy observed. All the by-products that can by any possibility be used are turned to account. The experience of such an establishment is worthy of attention.

#### SUPPLY OF COAL.

The supply of coal in the State is a subject of the greatest importance, and one to which particular attention should be given. The extension of the known area of the carboniferous formation in the State by recent discoveries is an encouraging fact, which may result in important developments.

#### LITHOLOGY.

There is no branch of geology of which the masses are so generally ignorant as the science of lithology. Mining men, who visit the Museum, more frequently inquire for typical specimens of the rocks, than for any others. As soon as possible a collection of the foreign rocks should be purchased to supply this want. In the meantime a

collection of California rocks has been commenced, and sections will be cut for microscopical study and reference.

#### ETHNOLOGY.

Every object and all publications bearing on the ethnology of the State should be collected and carefully preserved. Considerable progress has been made in this direction. The Bureau has information of certain caves in the State which may be expected to yield interesting relics.

#### STATE MANUFACTURES.

Every encouragement should be offered to State manufactures, by giving information to those interested, as to the localities of natural products, and by placing on exhibition samples of manufactured goods of every description produced in the State. This policy has already been commenced, as an inspection of the cases in the Museum will show.

Collection of  
the Library of Congress

Manuscript  
of the  
History of the  
United States  
by John Adams

Volume 1  
of 2  
New York  
1797

Printed  
by  
J. B. Ruggles  
New York

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REPORT

OF THE

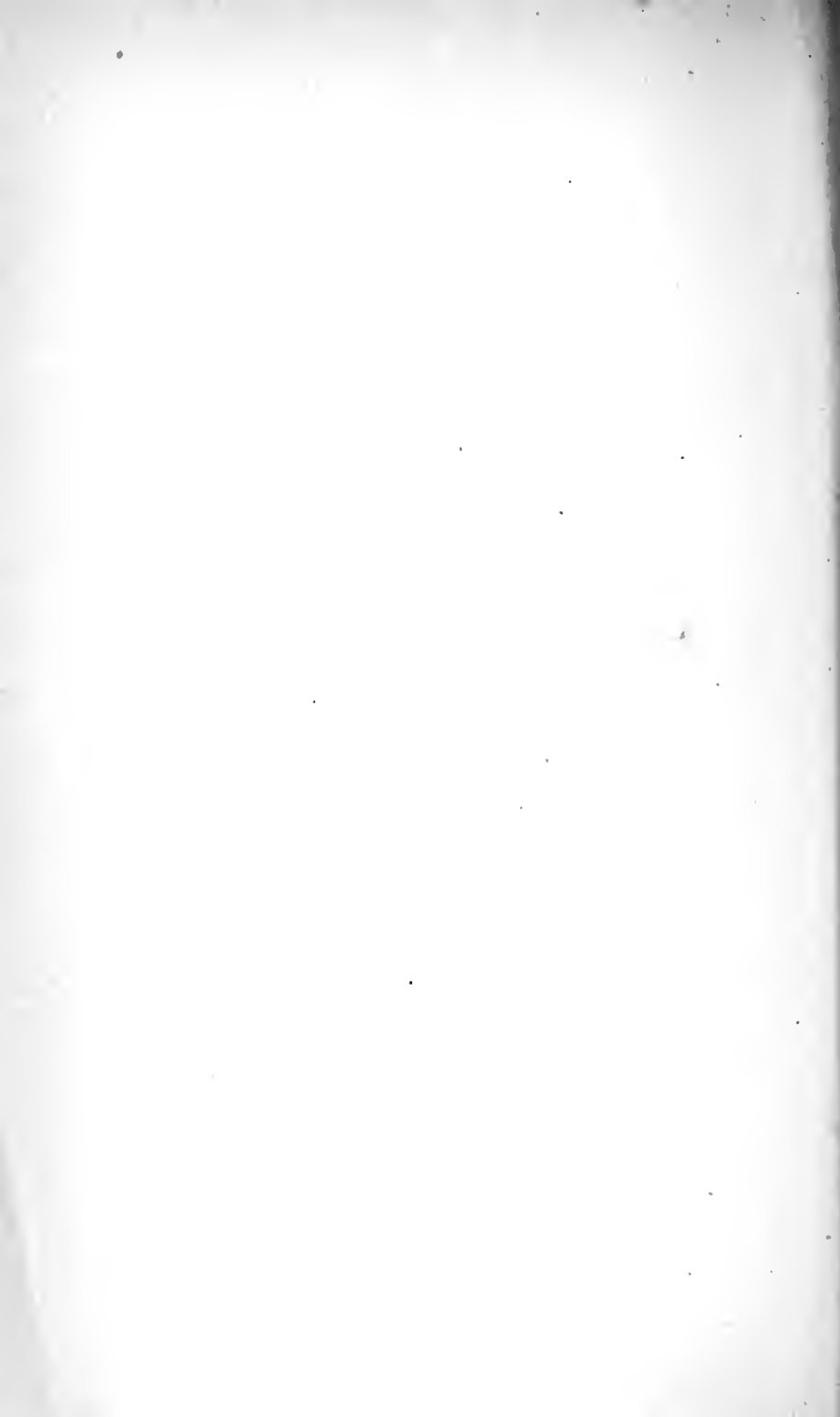
TRUSTEES OF THE STATE LIBRARY,

FOR THE THIRTY-FIRST FISCAL YEAR,

Beginning July 1st, 1879, and ending June 30th, 1880.

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# OFFICERS OF THE STATE LIBRARY.

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## BOARD OF TRUSTEES:

JOHN W. ARMSTRONG-----PRESIDENT.

JO HAMILTON,

F. W. HATCH,

E. W. MASLIN,

FRED. COX.

## LIBRARIAN:

ROBERT O. CRAVENS.

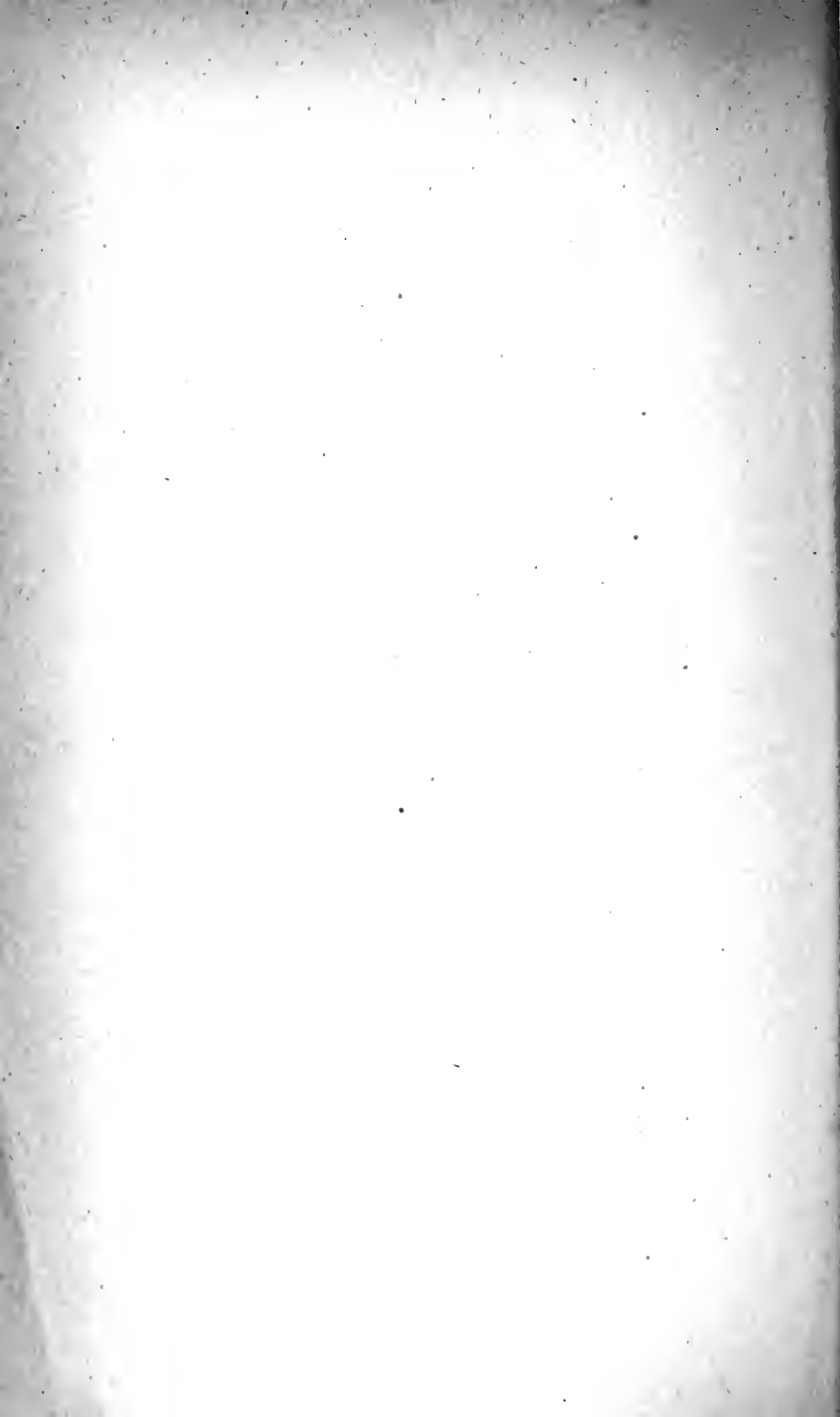
## DEPUTIES:

LAURA MORTON,

TALBOT H. WALLIS. .

## PORTER:

JAMES J. MANDEVILLE.





# REPORT.

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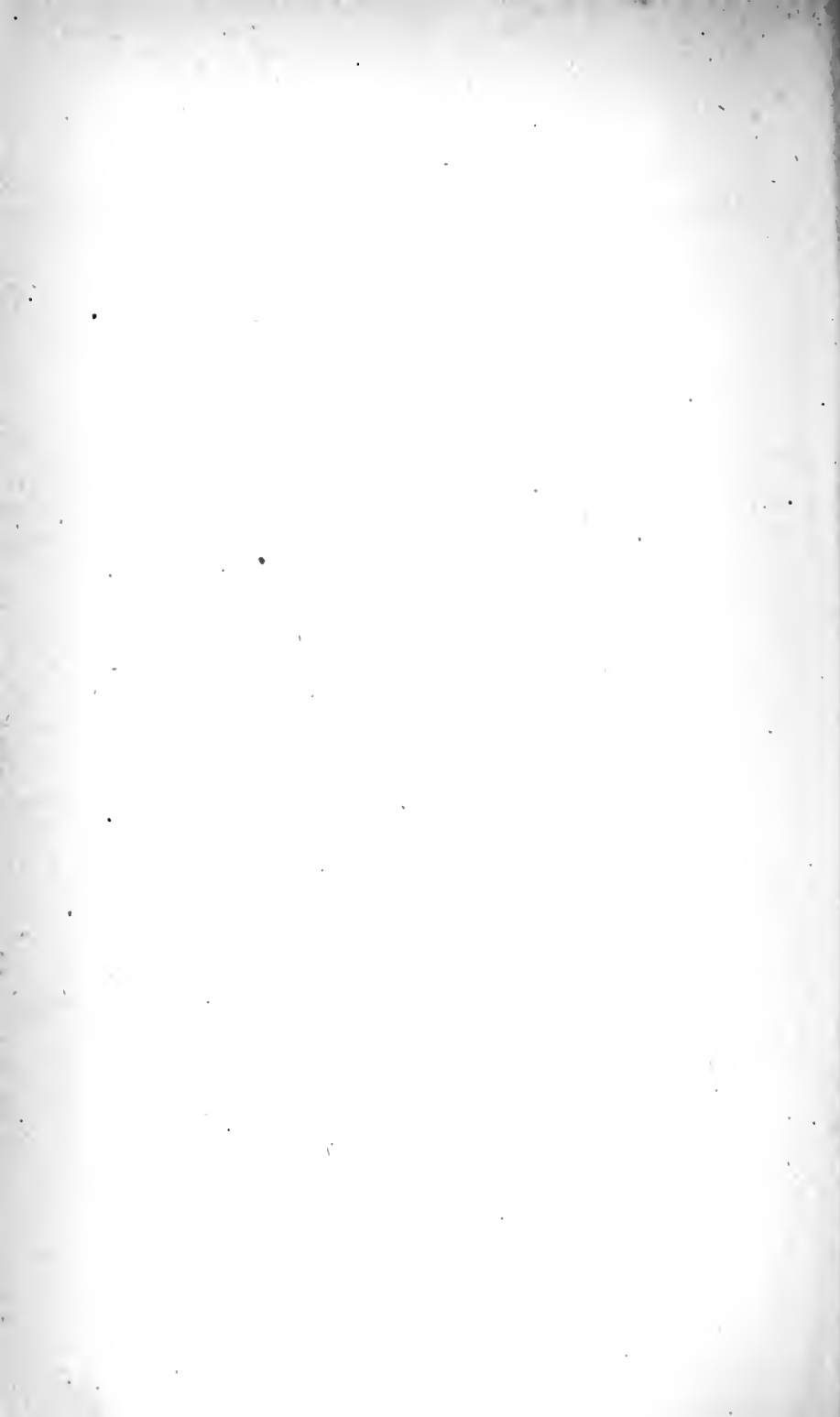
SACRAMENTO, November 17th, 1880.

*To his Excellency, GEORGE C. PERKINS Governor of California:*

SIR: I have the honor to transmit herewith the report of the Trustees of the State Library for the thirty-first fiscal year ending June 30th, 1880.

Very respectfully, your obedient servant,

ROBERT O. CRAVENS,  
State Librarian and Secretary of the Board of Trustees.



# REPORT OF THE TRUSTEES OF THE STATE LIBRARY.

STATE LIBRARY, November 17th, 1880.

*To his Excellency* GEORGE C. PERKINS, *Governor of California:*

The Trustees of the State Library respectfully present their report for the thirty-first fiscal year, ending June 30th, 1880.

At the close of the fiscal year ending June 30th, 1879, the number of volumes in the Library was 49,159—being in the General Library, 34,398; and in the Law Library, 14,761.

At the close of the fiscal year ending June 30th, 1880, there was 51,166—in the General Library, 35,685; and in the Law Library, 15,481. Total accessions during the year, 2,007.

The Trustees, with pleasure, report that the Library is in a flourishing condition, and steadily improving in the number and quality of the works borne upon its shelves. Special pains have been taken to make it what a State Library should be—a library of reference, containing only the best standard works, of permanent value, in the several departments of useful literature.

## LAW LIBRARY.

This department has received the most careful attention. All standard text books and treatises are added as soon as they can be obtained after publication. In the department of law reports and digests of reports, it is believed to be complete, even to the latest volume issued from the press. Indeed, it is so complete in all its departments, that it is seldom that any book is called for by the practicing lawyer which cannot be furnished him immediately.

The annexed financial statement shows the present condition of the Library Fund, and how the money drawn from the Treasury during the year has been expended.

JOHN W. ARMSTRONG,  
E. W. MASLIN,  
JO HAMILTON,  
F. W. HATCH,  
FRED. COX,

Trustees.

## STATEMENT.

*Showing in detail the expenditures from the Library Fund during the 31st fiscal year, from July 1st, 1879, to June 30th, 1880.*

1879.	Books.		
October 7—George I. Lytle.....		\$6 00	
October 7—Dewey & Company.....		10 00	
October 7—L. P. McCarty.....		4 00	
October 7—W. Garretson & Company.....		12 00	
October 7—George I. Lytle.....		11 85	
October 7—H. Still.....		85 00	
October 7—James T. White & Company.....		9 52	
October 7—A. Roman & Company.....		199 25	
October 7—A. L. Bancroft & Company.....		733 00	
October 7—F. H. Thomas & Company.....		5 25	
October 7—Library Journal.....		22 80	
October 7—The Nation.....		5 45	
October 7—W. H. & O. H. Morrison.....		15 00	
October 7—J. W. Bouton.....		314 90	
October 7—Little, Brown & Company.....		10 10	
October 7—A. C. Armstrong & Son.....		2 73	
October 7—D. Van Nostrand.....		23 78	
October 7—William Wood & Company.....		1 67	
October 7—United States Service Journal.....		2 50	
October 7—American Journal of Otology.....		3 00	
October 7—American Antiquarian Journal.....		3 00	
October 7—H. Keller & Company.....		125 00	
November 28—Southern Historical Society.....		\$21 00	\$1,605 80
November 28—Weed, Parsons & Company.....		5 00	
November 28—Little, Brown & Company.....		4 25	
November 28—William Wood & Company.....		28 04	
November 28—W. T. Baggett & Company.....		6 50	
November 28—Josiah Martin.....		3 00	
November 28—A. L. Bancroft & Company.....		65 00	
November 28—F. T. Thompson.....		70 00	
November 28—H. Keller & Company.....		231 50	
November 28—W. A. & C. S. Houghton.....		65 68	
December 8—C. H. Holton.....		\$3 90	\$499 97
December 8—H. Still.....		11 00	
December 8—W. A. & C. S. Houghton.....		70 63	
December 8—A. L. Bancroft & Company.....		392 14	
December 8—Alexander G. Abell.....		20 00	
December 8—W. H. & O. H. Morrison.....		5 00	
December 8—American Journal of Insanity.....		5 00	
December 8—J. W. Bouton.....		510 61	
December 8—D. Van Nostrand.....		208 08	
December 8—W. H. Holmes.....		11 50	
1880.			\$1,237 86
March 11—G. I. Lytle.....		\$1 95	
March 11—H. B. Burlingame.....		11 55	
March 11—C. E. Spencer.....		13 20	
March 11—News Letter.....		5 00	
March 11—Argonaut.....		4 00	
March 11—H. S. Crocker & Company.....		2 00	
March 11—Maxwell Brothers.....		2 00	
March 11—E. Smith.....		6 50	
March 11—Dewey & Company.....		10 00	
March 11—Daily Stock Report.....		10 00	
March 11—E. M. Sleaford.....		12 00	
March 11—James T. White & Company.....		8 61	
March 11—A. L. Bancroft & Company.....		231 72	
March 11—W. A. & C. S. Houghton.....		23 51	
Amount carried forward.....			342 04
			\$3,685 67

## Books—Continued.

Amount brought forward .....		\$3,685 67
March 11—F. H. Thomas & Company .....	\$866 25	
March 11—Central Law Journal .....	5 00	
March 11—W. H. & O. H. Morrison .....	4 50	
March 11—Albany Law Journal .....	5 00	
March 11—H. C. Lea & Company .....	5 00	
March 11—Library Journal .....	5 00	
March 11—W. B. Dana .....	43	
March 11—D. Van Nostrand .....	58	
March 11—William Wood & Company .....	28 24	
March 11—Little, Brown & Company .....	4 25	
		\$924 25
		<u>\$4,609 92</u>

## INSURANCE—1879-80.

1879.		
October 7—Hartford Insurance Company, \$5,000 .....	\$35 00	
October 7—Girard Insurance Company, \$5,000 .....	35 00	
October 7—Commercial Insurance Company, \$5,000 .....	35 00	
October 7—Firemen's Fund Insurance Company, \$5,000 .....	35 00	
October 7—London, Liverpool and Globe Insurance Company, \$5,000 .....	35 00	
October 7—Phoenix and Home Insurance Companies, joint, \$5,000 .....	35 00	
October 7—Union Insurance Company, \$10,000 .....	70 00	
October 7—North British & Mercantile Insurance Company, \$10,000 .....	70 00	
October 7—Etna Insurance Company, \$5,000 .....	35 00	
		<u>\$385 00</u>

## FREIGHT AND CARTAGE.

1879.		
October 7—Central Pacific Railroad Company, freight .....	\$24 00	
October 7—Central Pacific Railroad Company, freight .....	30 78	
		\$54 78
November 20—R. Mellon, cartage .....	\$0 75	
November 20—Central Pacific Railroad Company, freight .....	8 31	
November 20—Samuel Kingsbury, cartage .....	4 50	
		13 56
December 8—Central Pacific Railroad Company, freight .....	\$29 59	
1880.		
March 11—Central Pacific Railroad Company, freight .....	48 46	
		78 05
		<u>\$146 39</u>

## DISCOUNT ON SILVER AND PREMIUM ON EXCHANGE.

1879.		
October 7—Discount and exchange .....	\$7 00	
November 20—Discount and exchange .....	1 30	
December 8—Discount and exchange .....	4 75	
1880.		
March 11—Discount and exchange .....	4 25	
		<u>\$17 30</u>

## BINDING.

1879.		
October 7—James McClatchy & Company .....	\$12 00	
October 7—F. Foster .....	825 00	
		<u>\$837 00</u>

## ICE.

1879.		
October 7—Pacific Ice Company .....	\$13 25	
October 7—Pacific Ice Company .....	6 50	
November 20—Pacific Ice Company .....	6 50	
December 8—Pacific Ice Company .....	6 00	
1880.		
March 11—Pacific Ice Company .....	9 20	
		<u>\$41 45</u>

## MISCELLANEOUS.

1879.		
October 7—M. S. Hammer, soap-----	\$1 75	
October 7—Telegraph Mill Company, lumber-----	6 00	
		\$7 75
October 7—A. L. Bancroft & Company, Custom House dues-----		15 00
December 31—W. A. Gett, cleaning library-----	\$70 00	
December 31—F. H. Lambert, cleaning library-----	15 00	
December 31—W. F. Brown, cleaning library-----	72 50	
December 31—Edw. Duffy, cleaning library-----	62 50	
December 31—N. A. Cook, cleaning library-----	57 50	
December 31—J. G. Davis, repair of chairs-----	9 00	
December 31—Charles B. Herndon, kalsomining-----	28 50	
December 31—B. F. Alexander, repair of doors, etc.-----	41 15	
December 31—Huntington, Hopkins & Company, nail-lifter-----	3 50	
December 31—M. S. Hammer, soap-----	4 25	
December 31—A. Hathaway, cleaning carpets-----	107 10	
December 31—Locke & Lavenson, carpet lining-----	65 75	
December 31—L. L. Lewis & Company, repairing grate, etc.-----	17 00	
December 31—A. Flohr, repairing locks-----	10 75	
		564 50
1880.		
March 11—P. H. Russell, matches-----	1 00	
March 11—Rothfield Brothers, towels-----	5 00	
March 11—W. H. Dyer, stepladder-----	5 50	
March 11—Locke & Lavenson, carpet rug-----	10 00	
		21 50
		\$608 75

## RECAPITULATION.

To balance-----	\$19 30	
To books sold-----	2 80	
To Controller's Warrants-----	6,638 09	
		\$6,660 19
By books purchased-----	\$4,609 92	
By insurance-----	385 00	
By freight and cartage-----	146 39	
By discount and exchange-----	17 30	
By binding-----	837 00	
By ice-----	41 45	
By miscellaneous-----	608 75	
By balance-----	14 38	
		\$6,660 19
To balance brought forward unexpended-----	\$14 38	

## STATEMENT

*Showing the condition of the State Library Fund from July 1st, 1879, to June 30th, 1880.*

CREDITS.		
July 1st, 1879—By balance forward-----	\$7,181 31	
June 30th, 1880—By fees from the Secretary of State-----	9,136 90	
		\$16,318 21
DEBITS.		
June 30th, 1880—To warrants issued-----	\$6,638 09	
To balance-----	9,680 12	
		\$16,318 21
July 1st, 1880—By balance on hand-----	\$9,680 12	

## STATEMENT

*Showing how the appropriation for postage and expressage for the 31st fiscal year has been expended, from July 1st, 1879, to June 30th, 1880.*

July 1st, 1879—Unexpended balance 30th fiscal year-----	\$155 00	
Appropriation for 31st fiscal year-----	200 00	\$355 00
July 15th, 1879—Wells, Fargo & Co., expressage, 30th fiscal year-----	\$108 00	
November 29th, 1879—Wells, Fargo & Co., expressage, 30th fiscal year-----	14 90	
January 2d, 1880—W. C. Hopping, postage stamps-----	20 00	
January 7th, 1880—Wells, Fargo & Co., expressage-----	13 15	
February 18th, 1880—W. C. Hopping, post office stamps-----	12 00	
February 28th, 1880—W. C. Hopping, post office box rent-----	4 00	
May 5th, 1880—W. C. Hopping, stamps and box rent-----	20 00	
May 5th, 1880—Wells, Fargo & Co., expressage-----	27 05	
Balance-----	135 90	\$355 00
July 1st, 1880—Balance unexpended-----	\$135 90	

STATE OF CALIFORNIA, }  
County of Sacramento, } ss.

I, R. O. Cravens, Secretary of the Board of Trustees of the State Library, do solemnly swear that the foregoing is a true and correct statement of expenditures for the State Library for the thirty-first fiscal year, from July 1st, 1879, to June 30th, 1880.

R. O. CRAVENS.

Subscribed and sworn to before me this 16th day of November, 1880.

[SEAL.]

FRANK W. GROSS,  
Clerk Supreme Court.

## BOOKS AND PAMPHLETS

*Received in Exchange, Donations from other States and Countries, and from Individuals.*

DONOR.	Title.
Alabama	Reports, Vols. 53, 54, 57, 58, 59, 60, 61.
Arizona	Laws, 1879.
Arkansas	Reports, Vol. 33.
Colorado	Reports, Vols. 3, 4.
Connecticut	Laws, 1879.
	Reports, Vols. 45, 46.
	Practice Act, 1879.
	Public Acts, January Session, 1880.
Dakota	Special Acts, January Session, 1880.
Delaware	Laws, 1879.
Idaho	Laws, 1879.
	Laws, 1878.
Illinois	Council and House Journals, 1879.
	Reports, Vols. 88, 89, 90, 91, 92.
	Laws, 1879.
	Transactions of the Department of Agriculture, 1877, 1878.
	Annual Report of the Warehouse and Railroad Commissioners, 1878.
	Annual Report of the Industrial University, 1878.
	Annual Report of Public Charities, 1878.
	Insurance Reports, 1879, 1880.
	School Report, 1877-78.
	School Law, 1877-78.
	Senate and House Journals, 1879.
Indiana	Reports to the General Assembly, 1879, 4 vols.
	Reports, Vols. 60, 61.
Iowa	Geological Survey Reports, 1876-77-78.
	Reports, Vols. 48, 49, 50, 51.
Kansas	Railroad Commissioners' Report, 1878.
Kentucky	Reports, Vols. 22, 23.
	Laws, 1878.
Louisiana	Agricultural Report, 1879.
	Annual Reports, Vol. 31.
Maine	Laws, 1880.
	Reports, Vols. 68, 69.
Maryland	Laws, 1879.
	Reports, Vols. 48, 49, 50.
	Revised Code, 1878.
	Scharf's History of Maryland, 1600-1880, 3 vols.
	Wingate's Maryland Register, 1874, 1875, 1876.
	Hinkley's Testamentary Law, etc.
	Senate and House Journals, 1880.
	Documents, 1880.
Massachusetts	Laws, 1880.
	Public Documents, 1878, Nos. 1 to 36, 4 vols.
	Acts and Resolves, 1878.
Michigan	Massachusetts Reports, 126, 127.
	Reports, Vols. 37, 40, 41.
	Laws, 1879.
	Public Acts, 1877.
Minnesota	Geological Survey, Vol. 3.
	Reports, Vols. 24, 25.
	Statutes, 1878.
	Impeachment of Sherman Page, 3 vols.
	General Laws, 1879.
	Special Laws, 1879.
	Executive Documents, 1878.
	Statistics, 1879.
Mississippi	Reports of State officers, 1878.
	Laws, 1878.
Missouri	Reports, Vol. 56.
	Reports, Vols. 67, 68, 69.
	Laws, 1879.



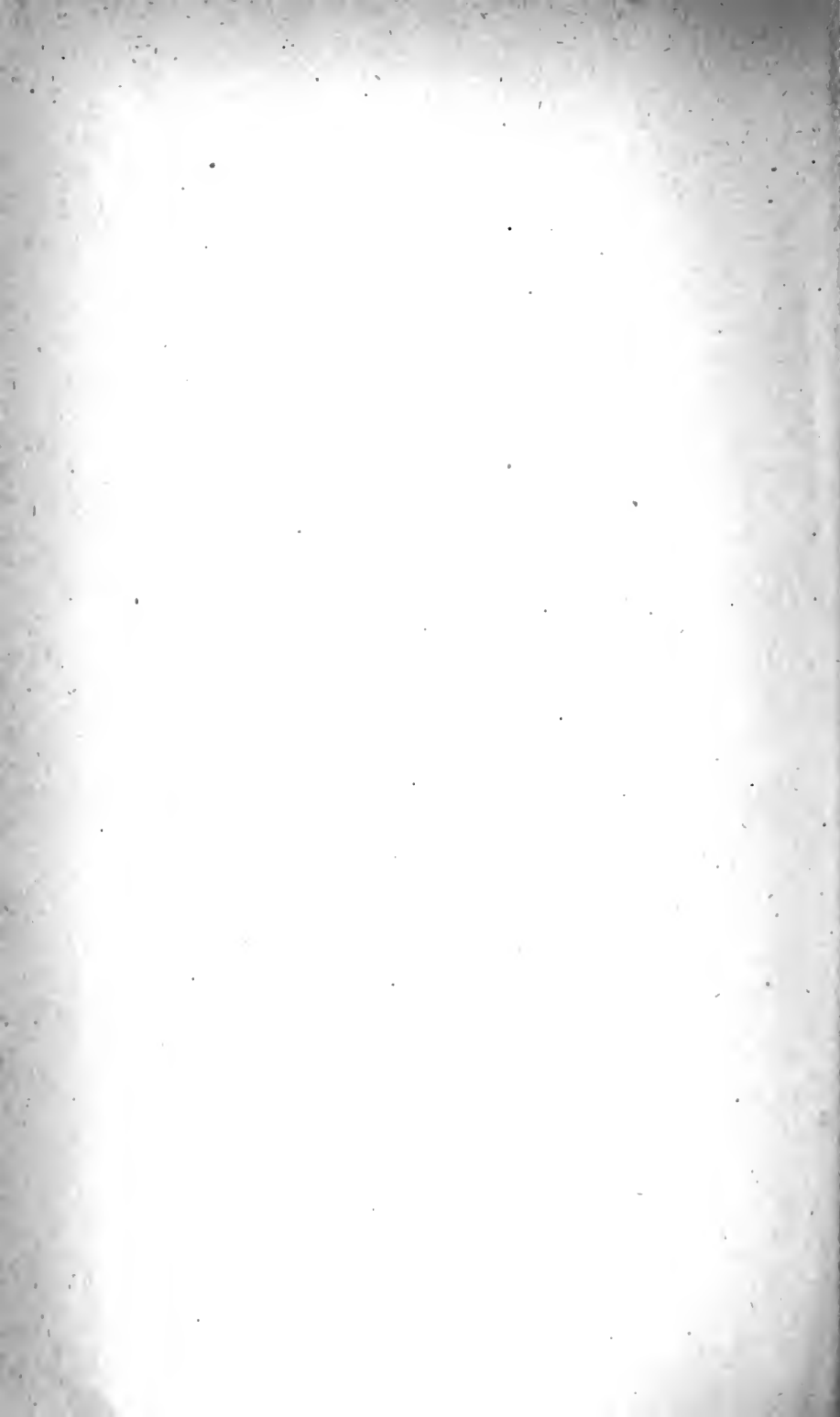
## BOOKS AND PAMPHLETS—Continued.

DONOR.	Title.
Missouri	Report of the State Board of Equalization, 1877. Agricultural Report, 1878.
Nebraska	Reports, Vols. 8, 9. Laws, 1879. Senate and House Journals, 1879.
Nevada	Physical Geography and Geology of Nebraska, 1880. Reports, Vol. 13. Statutes, 1879.
New Hampshire	Report of the State Mineralogist, 1877-78. Senate and House Journals, 1879. Official Reports and Documents, 1879.
New Jersey	Laws, 1879, Geological Report, Atlas, 1878. Senate and Assembly Journals, 1879. Laws, 1879. N. J. Equity reports, Vols. 30, 31. N. J. Law Reports, Vols. 40, 41. Legislative Documents, 1879-80.
New Mexico	Minutes of the Provincial Council, 1775-76. Laws, 1875 and 1876.
New York	New York Reports, Vols. 73, 74, 75, 76, 77. Supreme Court Reports, Vols. 24, 25, 26, 27. Laws, 1879. State Museum Report, for 1879. Report of Special Commission on Normal School, 1879. Report of Managers of the State Lunatic Asylum, 1879.
North Carolina	Laws, 1879. Special Laws, 1880. Reports, Vols. 81, 82.
Ohio	Reports of State Officers, 1877. Executive Documents, 2 Vols., 1878. Geological Report, 1878. Revised Laws, 1880. Laws, 1878. Senate and House Journals, 1879. Ohio State Reports, Vols. 32, 33, 34.
Pennsylvania	Pennsylvania State Reports, Vols. 86, 87, 88.
Rhode Island	Acts, Resolves, and Reports, 1880. Rhode Island Reports, Vol. 12.
South Carolina	Richardson's Reports, Vols. 9, 10, 11. Senate and House Journals, 1877-8, and 1879-80. Reports and Resolutions, 1879-80. Acts and Resolves, 1879-80.
Tennessee	Laws, 1879. Senate and House Journals, and Appendices, 1879. Lea's Reports, Vol. 2. Baxter's Reports, Vols. 6, 7. Acts of Extra Session, 1879.
Texas	Court of Appeals Reports, Vols. 5, 6, 7. Laws, 1879. General Laws, Special Session, 1879. Texas Reports, Vols. 50, 51. Revised Statutes, 1879. Reports, Vols. 50, 51.
Vermont	Governor and Council, 1813-24. Governor and Council, 1822-30. Laws, 1878. Senate and House Journals, 1878. Legislative Documents, 1878. Legislative Directory, 1878. State Officers' Reports, 1878. School Report, 1878. Agricultural Reports, 1877 and 1878. Registration Reports, 1875 and 1876. Historical Society Proceedings, 1878.
Virginia	Grattan's Reports, Vols. 29, 30, 31. Laws, 1878-9. Senate and House Journals, and Documents, 1878-9. Acts, 1879-80.

## BOOKS AND PAMPHLETS—Continued.

DONOR.	Title.
West Virginia -----	Reports, Vols. 13, 14, 15.
Wisconsin -----	Reports, Vols. 46, 47.
	Senate and House Journals, 1880.
	Senate Messages and Documents, 1880.
	Laws, 1880.
United States Patent Office -----	Monthly Reports of Plans and Specifications, May, 1879, to February, 1880.
	Patent Office Weekly Gazette, July, 1879, to July, 1880.
	Report of the Commissioner of Patents, for 1878.
United States Department of Engineers -----	Chief Engineer's Report, 1878.
	Memoirs of Explorations since 1800.
United States Department of Agriculture -----	Index to Agricultural Reports, from 1837 to 1876.
Quebec -----	Statutes, 1878.
San Francisco -----	Municipal Reports, 1878-9.
Booth, Hon. Newton -----	United States Official Register, 1871, 1873, 1875, and 1877.
Chase, Hon. Warren -----	Life Line of the Lone One.
Maisch, J. M. -----	Transactions of the American Pharmaceutic Association, 1878 and 1879.
Tyrrell, G. G. -----	Transactions of the California Medical Association, 1878-9.
Willey, Rev. S. H. -----	Thirty Years in California.
Thompson, F. P. -----	Iowa Territorial Laws, 1839.





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FOURTEENTH REPORT

OF THE

BOARD OF DIRECTORS AND OFFICERS

OF THE

CALIFORNIA INSTITUTION FOR THE EDUCATION OF THE

DEAF AND DUMB, AND THE BLIND,

FOR THE

Twelve Months ending June 30, 1880.

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## BOARD OF DIRECTORS.

---

J. MORA MOSS *	President.
JOHN A. STANLY	Vice-President.
E. J. CRANE.	
ISAAC WORMSER	Auditor.
GEO. D. DORNIN.	
H. A. PALMER	Secretary and Treasurer.

---

## OFFICERS OF THE INSTITUTION.

---

PRINCIPAL,  
WARRING WILKINSON, M. A.

TEACHERS OF THE DEAF AND DUMB,  
GEORGE B. GOODALL, M. A.,  
HENRY FRANK,  
WILLIAM A. CALDWELL, M. A.,  
DOUGLAS TILDEN,  
NETTIE STEWART,  
PHEBE J. WRIGHT.

TEACHER OF DRAWING,  
THEOPHILUS d'ESTRELLA.

TEACHERS OF THE BLIND,  
CHARLES T. WILKINSON,  
MRS. ANGÉLIQUE R. GOODALL.

TEACHER OF MUSIC,  
GEORGE B. GOODALL, M. A.

DOMESTIC DEPARTMENT.

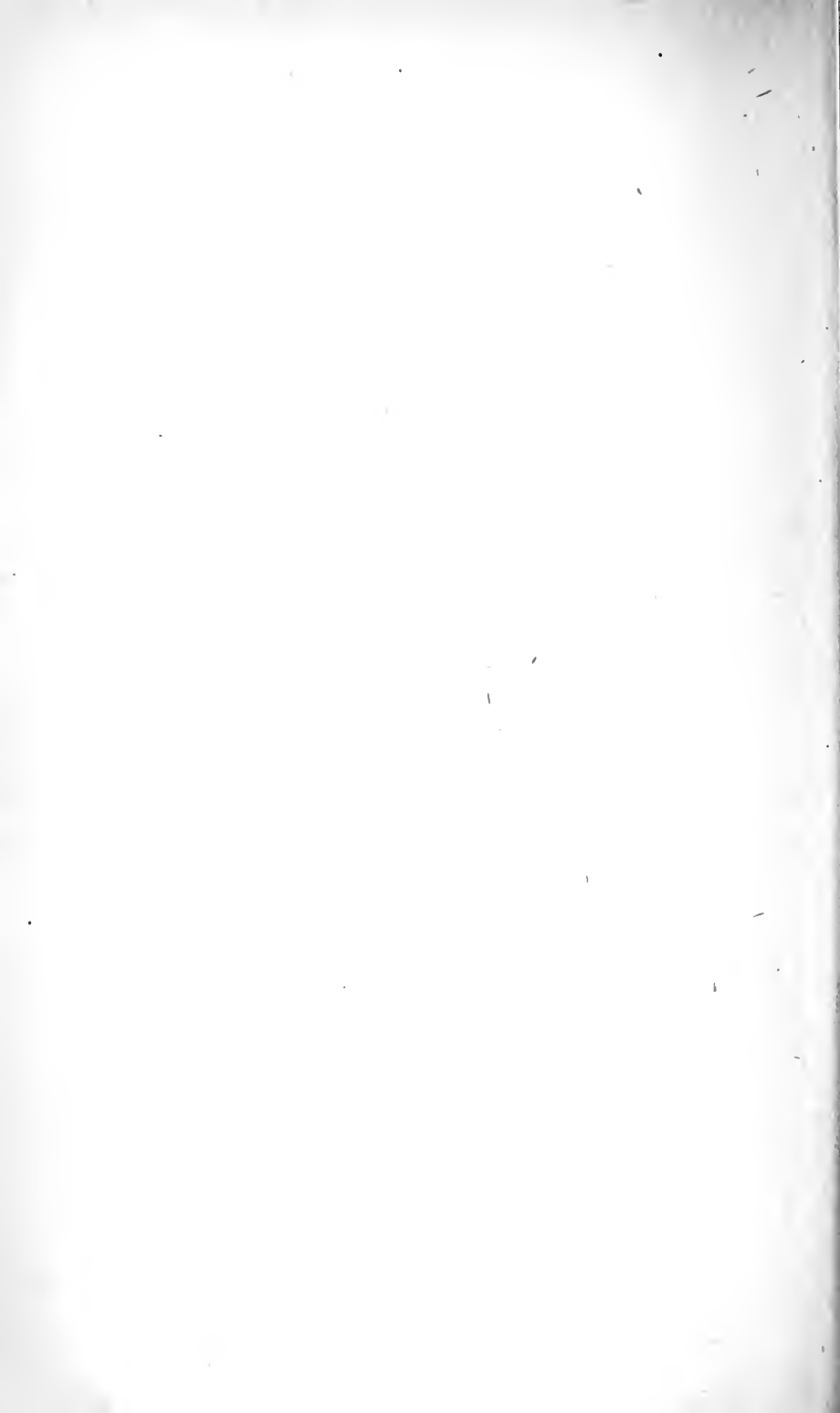
P. WHEELER, M. D.	Physician.
CLARENCE MERRILL	Clerk.
MRS. HARRIET B. WILLARD	Matron-in-Chief.
MRS. M. L. BILLINGS	Matron of "Girls' Home."
MISS J. OSGOOD	Matron of "Boys' Home."
MISS M. E. SHARR	Nurse.

MECHANICAL DEPARTMENT.

FRED. HANSEN	Engineer.
E. P. PIKE	Carpenter.

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\* Deceased, November 21st, 1880.





# REPORT.

OFFICE OF THE CALIFORNIA INSTITUTION FOR THE  
EDUCATION OF THE DEAF AND DUMB, AND THE BLIND, }  
BERKELEY, December 1, 1880. }

*To his Excellency GEO. C. PERKINS, Governor of the State of California:*

SIR: The Board of Directors of the California Institution for the Deaf and Dumb, and the Blind, respectfully submit the report of their trust, and its management for the year ending June 30, 1880.

The Treasurer's statement herewith annexed exhibits the receipts and expenditures for the fiscal year. The Principal's dissections, also submitted herewith, give the itemized details of these expenditures.

An examination of these details will show as follows:

Total disbursements on account of current expenses.....	\$38,374 77
Extraordinary expenses .....	2,575 58
Paid balance at bank.....	4,317 85
Total expenditures.....	\$45,268 20

## RECEIPTS.

From State Treasury, appropriation for support.....	\$33,000 00
From Principal.....	2,648 09
From State Treasury, appropriation for deficiency, 1879.....	8,532 00
	\$44,180 09
Deficiency.....	\$1,088 11

The deficiency noted above is apparent, not real, for there is an unpaid warrant of \$3,000 for the month of June, which when cashed will pay this deficiency and leave a cash balance in favor of the Institution of \$1,911 89. With this balance, and the appropriation made at the last session of the Legislature, the Directors hope to carry the Institution through the present fiscal year without a deficiency.

The Principal's report shows an attendance during the year, of one hundred and forty-one pupils. Tabulated, the changes have been as follows:

On the rolls June 30, 1879.....	125
Admitted .....	16
	141
Graduated or discharged.....	13
On rolls June 30, 1880.....	128
Admitted since opening of term.....	11
Total on rolls at date of writing.....	139

The growth of the Institution in numbers is not as rapid as it would be if the Directors had more room at their disposal. All new pupils have to be housed in the wooden building, formerly used as a shop. The Board does not care to assume the responsibility of periling the lives of helpless children in a structure so unsafe. For this reason they have restricted the admissions to cases of urgent need, hoping that before another year the new "home," now in process of construction, will enable them to accommodate all who may apply, and who possess the legal qualifications of age, health, and intelligence.

The health of the pupils has been uniformly good.

The Principal reports commendable progress in the class-rooms, and the examinations held at the close of each year show faithful labor on the part of the teachers, and industry and studiousness on the part of the pupils. The Directors are satisfied that no schools in the State exhibit evidence of more thorough work than this Institution.

The Directors are happy to report satisfactory progress in the erection of the new buildings provided for by the last Legislature. The refectory is about completed, while the girls' "home" is roofed in and ready for the carpentry work. The buildings are all models of convenience, comfort, and safety, and the Directors feel confident that in adopting the plan of segregated houses, and in the details of construction, their work will meet the approval of all who have made the care of the unfortunate a study.

The matter of workshops, referred to by the Principal in his report, has occupied the serious attention of the Directors for years. Ever since the fire which destroyed the old building, the department of handicraft has been in abeyance. Its quarters have been used for living purposes, and the pupils are deprived of a most important part of their education. Shall this state of things continue? Shall those whom nature has crippled be deprived of any resource which we can give them?

The culture of the class-room is designed to bring the deaf and the blind into intellectual fellowship with the world; the instruction of the shop is designed to place them in the ranks of producers, where they not only support themselves, but add something to the industrial forces of the State. It is evident, then, that the purpose of the Institution is partially defeated, so long as the pupils graduate with no knowledge of handicraft. For reasons which the Principal gives, the deaf mute and the blind cannot learn trades after leaving school. They are too old to begin apprenticeship, and master workmen will not take the trouble to teach them.

The Directors, therefore, most respectfully ask your Excellency to call the attention of the Legislature to the necessity of making an appropriation for an educational building, to cost \$73,000, according to plans already drawn. This will enable the Directors to vacate the wooden structure now occupied as a school house, and put it to its original use as a shop.

As the new "home" for the girls will be completed in February, it will be necessary for the Legislature to provide for its furnishing. For this purpose the Directors ask an appropriation of \$2,500. Estimates have been made for a system of hot water heating for each of the "homes." It combines ventilating with heating, and will also supply the baths with hot water when necessary. The cost is \$900

each. The Directors therefore respectfully ask an appropriation of \$2,700 for carrying out this improvement. The experience of the last two years has convinced the Directors that heating the building by fireplaces is neither economical nor safe. The danger of children's clothing taking fire from a blazing grate is a cause of constant anxiety, while the cost of coal and attendance would pay a fair interest on the money needed to put in a hot water apparatus.

The Directors also ask for an appropriation of \$5,000, with which to improve the grounds. It is hardly creditable to the commonwealth that one of its most valuable properties, situated in the most visited and sightly portions of the State, and close to its largest cities, should lack an adornment somewhat in keeping with the noteworthy buildings which have been erected. Something has been done in the way of tree planting, terracing, and road making, but it has all been done with little help, and less means. The fence, a cheap one originally, is old and unsightly; a gateway and gate keeper's lodge are needed, and the main avenue should be macadamized. These improvements are urgent necessities.

Deducting the permanent improvements of last year, the cost of pupils per capita has been about \$285, which includes board, tuition, fuel, lights, washing, books, medicines, and medical attendance, and the clothing of about twenty-five per cent. of the pupils. It is expected that the institution will have one hundred and fifty to provide for, for the ensuing two years, and the Directors respectfully ask for an appropriation of \$40,000 per annum; to meet their expenses. This is a per capita of \$266 66.

The Treasurer's statement shows the condition of the various invested endowments of the institution. From the Durham bequest the Directors have established five scholarships, to be known as the "Durham scholarships," to be conferred upon the foremost pupils, viz: two from the deaf and dumb boys, one from the blind boys, one from the deaf and dumb girls, and one from the blind girls.

These scholarships are for three years, and are of the value of \$50 for the first year, \$75 for the second year, and \$100 for the third year. The prize scholars for 1880 are: Theodore Grady, George A. Shoaf, Meta M. Boothe, Jacob Catoir, and Annie Fennel.

It was expected that this report would have been written by other and abler hands than mine, but in the midst of his work, the pen dropped from the feeble fingers of our esteemed associate and friend, and the great heart of J. Mora Moss, so full of love, and tenderness, and sympathy, ceased to beat forever. The death of this rare and excellent man deserves more than a passing mention, and the Directors desire to put upon record their deep sense of the loss which, individually, and as a Board, they have been called to suffer.

Mr. Moss was the typical trustee; the ideal director for public institutions. His large wealth gave him the leisure to attend to such duties; his intellectual gifts and scholastic attainments well fitted him to advise and counsel in matters of education; his strict business habits made him understand the value of time and promptness. He was spartan in firmness and yet tender and sympathetic as a woman. His kingly presence and courtesy of manner commanded the respect of all who came in contact with him. He never forgot what was due to himself or to others. His integrity was of the stalwart type. He administered a public trust with the same careful conservatism that he gave to his own business affairs. For all the

meannesses and trickeries of life, he had a supreme contempt. His moral purpose was never dimmed by the mist of selfishness or prejudice. He needed no bonds to hold him to service; his word had all the sanctity of an oath. He was loyal to duty, faithful in friendship, gentle in speech, courteous in manner, charitable to all.

“And so he bore without reproach, the grand old name of *gentleman*.”

Respectfully submitted.

JNO. A. STANLY,  
Vice-President.

# REPORT OF THE PRINCIPAL.

*To the Board of Directors of the California Institution for the Deaf and Dumb, and the Blind:*

GENTLEMEN: The record of the year, which I have the honor herewith to present, is for the twelve months ending June 30, 1880. This annual, instead of the usual biennial report, is made necessary by the meeting of the Legislature in January, 1881, as required by the terms of the new Constitution.

## NUMBER OF PUPILS.

Since the date of my last report the movement of pupils has been as follows:

On the rolls June 30, 1879:

DEAF AND DUMB.		
Boys	59	
Girls	40	
		99
BLIND.		
Boys	14	
Girls	12	
		26
Total both classes		125

The admissions since same date have been:

DEAF AND DUMB.		
Boys	9	
Girls	4	
		13
BLIND.		
Boys	1	
Girls	2	
		3
Total admissions		16
Total under instruction		141

There have been graduated and discharged since same date:

DEAF AND DUMB.		
Boys	4	
Girls	5	
		9
BLIND.		
Boys	2	
Girls	2	
		4
		13
On rolls June 30, 1880		128

## Admitted since opening of term :

Deaf and dumb .....	8
Blind .....	3
	<hr/> 11
On rolls October 15th .....	139

As all new pupils have to be lodged in the wooden shop building, where the danger in case of fire would be very great, the Board has felt it a duty to limit the admissions to cases of urgent necessity. As the new "home" for girls approaches completion, it is hoped that the need for such restrictions will soon be removed, and that all the deaf and blind children of the State who are proper subjects of our work, may have access to that instruction, which, by reason of their infirmity, is denied them in the common schools.

And here it may not be amiss to say that *dumb* children who are not deaf, do not come within the line of work here pursued. Our pupils are dumb only because they are deaf, and if by any miracle their ears could be opened to the world of sound, they would learn to talk just as a babe does. Speech is neither a gift nor an intuition. It is acquired by effort, and is held by constant practice. It is lost by disuse. Let a child five or six years of age, who has learned to speak ever so well, become deaf by accident or disease, and the speech he has acquired will in a few years deteriorate to a discordant and unintelligible jargon, which only the tender love of a mother can comprehend. Few can have failed to notice how soon the voice of even an adult undergoes marked change when the hearing is lost, and how hard it is for such a person to catch new pronunciations. But a child may hear, and not talk. In rare cases this muteness may result from malformation of the vocal organs; almost always, however, it is due to lack of intelligence. The organs of speech are perfect, but the mind has not sufficient development to imitate the sounds it hears, and translate them into language. The degrees of intellect in this class of persons are various. Some are so low down as hardly to rank the mollusk. In the City of Oakland there is a little boy ten years old, who is deaf, dumb, blind, idiotic, unable to walk or stand, with not even the instincts that are found in the lowest orders. This child whines when hungry or in pain; eats and digests the food put into its mouth. The automatic functions of life go on; the coarser nerves of sensation carry their messages of physical discomfort, but its intellectual darkness is as profound as that of the oyster in the deep sea.

From this rudimentary, almost protoplasmic, mental condition sometimes met with, there is an upward trend, by gradual steps, to children who are, in the euphemistic phrase of parents, "just a little queer." Many of these can hear, understand what is said to them, obey many simple directions; sometimes dress, undress, and feed themselves. For the absolute idiot, humanity can do nothing but minister to its physical wants, and patiently wait for that death which, for such, is indeed the "greatest boon of life." But for those who are more or less weak minded, much can be done to lift them from their low estate, and relieve friends and society of the burden which their care involves. The work, however, must be done by other methods than the means used in the instruction of the deaf.

I have written this for two reasons: First, to correct the popular

impression that this institution is for the *dumb* as well as for the deaf; and second, in the hope that public attention may be drawn to the necessity of soon establishing a school for weak-minded children.

#### HEALTH.

The excellent sanitary condition of the institution is evidenced by the good health which has prevailed among the pupils during the year. A mild epidemic of mumps last Winter interfered with the regular routine of school for two or three weeks, but all recovered without the troublesome *sequelæ* which sometimes attend this malady. There has been no case of sickness during the term sufficiently serious to require night watching, nor have there been any of those severe sprains and broken bones that might be occasionally looked for among so large a gathering of rugged, boisterous boys. This freedom from disease and accident is largely due to the unremitting care and attention of the matrons, whose services in this direction I take pleasure in commending. The changes in the *personnel* of the institution have been more than usual.

The saddest event of the year was the death of Mr. Foland P. Fowler, by typhoid fever, contracted during the Summer vacation of 1879. Mr. Fowler had been in the service of the Board as teacher for six years, and was an earnest, faithful worker in the cause to which he had given his life, and his untimely death was keenly felt by his fellow teachers, and the many friends he had made.

The vacancy thus caused was filled by the appointment of Mr. Wm. A. Caldwell, from the Indiana institution. Miss Phebe J. Wright, of Michigan, and Mr. Douglas Tilden, a graduate of our own institution, have also been added to the corps of instructors. Mr. T. d'Estrella resigned as teacher in October, 1879, to pursue his art studies in the School of Design, in San Francisco. He continues, however, his connection with the institution as teacher of drawing. In the domestic department, Dr. Wm. M. Lawlor has resigned, to accept the position of quarantine officer of San Francisco, and Dr. P. Wheeler has been appointed to succeed him. Mr. Clarence Merrill has also been appointed to the office of Clerk, in place of George J. Illidge.

#### THE SCHOOLS.

The work in the schools for the past term presents much the same features as noticed in my last report. The policy of admitting children at six and seven years of age, is being justified by the results of the class-room, and the moral tone which pervades the institution. The care of so many young children necessarily brings much weariness, trouble, and anxiety, but the opportunity for early influencing the mind, and forming its character, is worth a great deal of trouble. Our pupils are not all angels, for deafness and blindness do not eliminate the human nature, which is often so wayward and perverse in young folks; but they will compare in conduct and studiousness most favorably with any boarding school within my knowledge. Good order, kindly feeling, and harmony, have prevailed throughout the year. The teachers have been faithful; the pupils have, as a rule, been industrious and docile, and if some have not profited as much as they might have done by the facilities offered them, it is because they have not reached that period of life when the love of fun gives place to the higher zest for knowledge.

## BUILDING AND IMPROVEMENTS.

The Legislature, at its last session, made an appropriation for completing the Refectory, and for building a new "home" for the girls. Work was commenced as soon as the plans were drawn, and has been pushed as vigorously as circumstances would permit up to the present writing. It is expected that the Refectory will be ready for occupation in time for Thanksgiving dinner, and thus add an increased joy to that day of annual festivity. The "home" will be completed early in the New Year if the weather permits the slating of the roof before the heavy rains set in.

Both these buildings are of the same plain, substantial character as the two "homes" erected under a previous appropriation, and are in pursuance of a plan on the "cottage" system, adopted after the disastrous fire of 1875. The estimates of cost submitted to the Legislature were based upon the expectation of doing the work by contract under the terms of the O'Connor Act; but a section of the bill making the appropriation required that all labor of construction should be done by "days work," and as eight hours constitute a legal day's work on State buildings, it will be seen that a very serious problem was forced upon the Board at the outset. The Directors determined, however, that if possible the appropriation should not be exceeded. All material was purchased at the lowest cash price; excellent superintendence was secured, and the best of labor employed. It is too soon to make positive assertions, but it is believed that the work will be done for the money.

An appropriation was also made for making a brick foundation under the shop building, whose underpinning began to show signs of settling and decay. During the Summer vacation this work was done; the roof and all the wood work were painted two coats; a brick foundation was made under the hospital cottage, which was also painted; an outside and convenient water-closet of brick was constructed, and all the drains and down pipes overhauled and put in good repair.

The improvement of the grounds has been carried on to a limited extent. A large amount of stone terrace wall has been built out of the material of the old ruins. The site of the ruins is being cleared for a boys' playground; the sand and lime is sifted and carted to the garden and fields as a fertilizer; the large stone sorted out for future walls and foundations, and the smaller stones for road beds and concrete. The progress is slow, for the force is small, and we have not the means to hire more.

## THE EDUCATIONAL BUILDING.

It is earnestly hoped that the coming Legislature will make the necessary appropriation for erecting the educational building to accommodate the schools, assembly hall, and the administrative offices. When this is done the system will be complete; each department will be provided for, and the shops which have been closed for five years can again be established and the Board be enabled to give the pupils not only the intellectual training which brings them into fellowship with their kind, but also that mechanical skill which shall fit them for self-support.

It is not necessary at this day to make an argument in behalf of



instruction in handicraft. "What shall be done with our boys?" is the pressing question of the time. How prevent the tendency of our youth to idleness, poverty, and crime? The patent answer is: give work to brain and hand. When and how this shall be done is subject for thoughtful consideration. Whether, as in France, there should be government schools for the training of mechanics, or whether this end shall be accomplished through individual benefactions, as contemplated by the Lick bequest, which sets apart \$540,000 for a mechanical school, I am not prepared to say, but that the deaf mute must get his knowledge of handicraft while in school, or not at all, I am quite sure. In the first place, the deaf mute graduates at the age of nineteen or twenty years, a period too late in life to enter on apprenticeship; and secondly, no employer will take the trouble to instruct a deaf boy in the details of a craft through the tedious process of writing when he can obtain those who can hear.

An institution of this kind, therefore, must have shops well supplied with proper machinery and skilled foremen, who are paid to take this trouble and prepare young men for the great struggle for existence. Lacking this important department, an institution comes short of the highest success, and by just so much fails of its purpose.

The building now used for schools was intended for a shop. It was diverted from its original use by the exigencies of the fire, and must be occupied as at present until the State provides other and better accommodations. I trust, therefore, that the Board will urge this matter upon the attention of the Legislature about to convene. The plans are drawn for a school building in keeping with the general style of architecture heretofore adopted, and which by its plain and substantial character has met with such general approval. The building combines twelve class-rooms, library, and board-rooms, assembly hall and gallery, reception-room, offices for Principal and Clerk, rooms for apparatus and supplies, with the necessary closets, and hat and cloak-rooms. The whole cost is estimated to be \$73,000.

#### FINANCIAL MATTERS.

The Treasurer's statement shows the following receipts and disbursements for the year ending June 30, 1880:

RECEIPTS.	
From State treasury, for support.....	\$33,000 00
From Principal.....	2,648 09
From State treasury account, deficiency of 1879.....	8,532 00
Total.....	<u>\$44,180 09</u>
DISBURSEMENTS.	
For salaries and wages, as per dissections.....	\$16,965 87
For groceries and provisions, as per dissections.....	7,151 52
For clothing, as per dissections.....	689 51
For furniture, as per dissections.....	1,809 18
For furnishing Principal's house, as per dissections.....	1,270 44
For building and repairs, as per dissections.....	1,514 46
For fuel and lights, as per dissections.....	3,194 62
For laundry, as per dissections.....	1,225 77
For stable and dairy, as per dissections.....	1,497 30
For miscellaneous, as per dissections.....	2,058 67
Treasurer's salary.....	500 00
Interest, collections, charges, etc. ....	497 13
Total ordinary expenses.....	<u>\$38,374 47</u>

## EXPENDITURES FOR IMPROVEMENTS.

New kitchen ranges and furniture-----	\$469 45	
Water, gas, and sewers -----	302 61	
Improvement of grounds -----	1,803 52	2,575 58
Paid balances at bank, 1879-----		4,317 85
Total -----		\$45,267 90

This statement shows an apparent deficit of \$1,088 11, but there is a warrant for \$3,000 for the month of June, which, when paid, will leave a balance in favor of the institution of \$1,911 89.

It will be necessary to ask for an increase of appropriation to \$40,000 per annum for the two years ending June 30, 1883.

This estimate is for the education and support of 150 pupils at a per capita of \$266 66.

We have upon our rolls at present 139 pupils, which allows for an increase of only eleven for the two years to come. It will also be necessary to ask for an appropriation of \$2,500 for furnishing the new "home" for the girls, which ought to be completed by the first of February.

The method of heating the "homes" is not satisfactory. It is not safe. It is not economical. The care of a dozen grates requires the attention of a servant nearly all the time in cold weather to keep them going, and sweeping up the dirt and dust they cause. The consumption of coal is very great, as it is well known that in a fireplace only about five per cent of the heat of coal is saved. The children are tempted to play with the fire that is constantly before their eyes, and their clothing—of the girls especially—is liable to take fire. I therefore beg that the Board will ask of the Legislature an appropriation of \$2,700, to put in a hot water apparatus in each of the three "homes." The cost is estimated at \$900 each.

The grounds of the institution are not in a creditable condition. The building operations which have been going on for several years, perhaps justified the partial neglect, but as these operations and the disorder incident thereto approach an end, the grounds ought to receive attention. A gatehouse and gateway should command the entrance, and the main avenue be graded and covered with rock. The fence is a very cheap affair, and should be replaced with something more in keeping with the dignity of the State. An appropriation of \$5,000 is needed for these improvements.

## ACKNOWLEDGMENTS.

We are, as usual, under obligations to the Central Pacific Railroad Company for favors to our pupils who are unable to pay for their passage to and from home. In addition to the usual passes granted at the close of the school, the company put at our disposal two special cars to convey the pupils and officers to and from Shell Mound Park for their May picnic. The thanks of the Board are also due to Mr. Ludwig Siebe for the gratuitous use of his park and all its amusements, on the occasion referred to. Dr. R. E. Cole, of Oakland, has continued to our pupils those kind services in dentistry, which have done so much to relieve them of pain and suffering, and for extracting teeth has made no charge.

In closing this report, I wish again to thank the Directors for the continued kindness shown me during the many years we have been

in official relations, and to bear personal testimony to the unselfish zeal they have shown in the great work committed to their charge. With the growth of the institution and its building operations has come greatly increased demands upon their time and service, but the time and service have been given without stint or reward, save the consciousness of public duty faithfully performed.

Respectfully submitted.

WARRING WILKINSON,  
Principal.

INSTITUTE FOR THE DEAF AND DUMB AND THE BLIND, }  
BERKELEY, October 15th, 1880. }

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Since writing the above report, Mr. J. Mora Moss, for ten years President of the Board of Directors, has been called to his rest. The news of his death carried sorrow to many a heart, but to the officers and pupils of this institution, it came with all the force of a personal bereavement. His relation with us was not the perfunctory intercourse of a State officer and his charge; it was, rather, the sweet and tender intercourse of friendship. Connected with the management of other public and fiduciary trusts, his generous heart seemed to find peculiar satisfaction in the work of ameliorating the condition of the deaf and blind. The sightless eyes and deadened ears were a constant appeal to his sympathies; and, grand as he was in person, in manner, and in integrity, only those have seen him at his best who were privileged to witness his unostentatious but active benevolence. He was the kindest, most loving of men. His charity was like an underground stream, unseen of men, but watering the roots of life and enterprise in a thousand directions. To relieve sorrow and distress was with him a delight, not a duty. He gave money with as much joy as most men save it. His courtesy was unfailing. He was a gentleman—not after the selfish code of Chesterfield, but by the inherent gentleness of a Sir Roger de Coverley. His friendship was an education in all that refines and adorns manners and life. He welcomed a child or a servant with a certain grace that inspired self-respect and personal dignity. His visits at the institution were always the occasion of almost boisterous joy, and greetings that touched his heart and often brought tears. His memory will be the sweetest possession of these children of silence.

W. W.

November 30, 1880.

PRINCIPAL'S DISSECTIONS OF CURRENT EXPENSES FOR TWELVE MONTHS  
ENDING JUNE 30TH, 1880.

*Groceries and Provisions.*

Ammonia	\$3 60
Bacon, 63 pounds	6 90
Bath brick, 4 dozen	2 50
Beans, 667 pounds	12 53
Bread	68 67
Buckwheat, 750 pounds	31 00
Butter, 3,383 pounds	790 85
Canned beef	4 13
Canned pork and beans, 2 dozen	5 00
Canned lobsters, 2 dozen	6 00
Canned salmon, 4 dozen	10 00
Capers, 2 dozen	4 50
Carb. soda, 12 pounds	84
Cheese, 511 pounds	71 96
Chicory, 150 pounds	11 00
Chocolate	54
Cider, 4 gallons	3 00
Citron, 10 pounds	2 62
Coffee, 858 pounds	154 96
Cooking wine and brandy	5 50
Corn starch, 20 pounds	1 90
Crackers, 798 pounds	44 91
Cracked wheat, 550 pounds	18 50
Cranberries, 1 barrel	15 00
Cream tartar, 30 pounds	9 25
Currants and raisins	12 15
Curry powder	2 50
Extracts, assorted	20 25
Fish, fresh	44 90
Fish, salt, 700 pounds	41 37
Flour, 168½ barrels	1,030 01
Fruit	66 35
Fruit, dried, 589 pounds	72 65
Gelatine, 24 packages	3 75
Ginger, preserved	1 25
Ham, 587 pounds	79 91
Herbs, dried, 1½ dozen	2 00
Hominy, 200 pounds	17 35
Hops, 16 pounds	5 00
Hulled corn, 19½ gallons	5 75
Ice and ice cream	21 80
Lard, 922 pounds	119 95
Macaroni, 5 boxes	5 87
Mace, ground, 5 pounds	5 00
Malt, 20 pounds	1 20
Meal, 600 pounds	29 69
Meat, 39,585 pounds	2,446 33
Mustard, 35 pounds	8 13
Nutmegs, 5 pounds	5 35
Pearl barley, 50 pounds	2 75
Pepper, 57½ pounds	14 73
Pickles	30
Potash, 5 pounds	1 00
Potatoes and other vegetables, 26,406 pounds	229 37
Peas, dried, 540 pounds	11 48
Potted meats	2 85
Poultry	71 96
Rice, 650 pounds	44 75
Sago, 25 pounds	2 00
Salad oil, 6 dozen	30 50
Saleratus, 36 pounds	2 16
Salt soda, 797 pounds	16 13
Salt, dairy, 1,600 pounds	13 95
Salt, pickling, 600 pounds	3 90

Amount carried forward. . . . . \$5,781 03

Amount brought forward	\$5,781 03	
Salt peter, 7 pounds	92	
Sauce, 4 dozen	17 50	
Sapolio, 7 dozen	7 22	
Silicon, 1 dozen	1 25	
Soap, brown, 918 pounds	74 34	
Soap, castile, 324 pounds	44 07	
Soap, toilet	9 18	
Spices	26 25	
Split peas, 25 pounds	1 25	
Sugar, brown, 4,740 pounds	441 73	
Sugar, crushed, 3,471 pounds	356 03	
Sugar, powdered, 450 pounds	55 36	
Syrup, 8 barrels	136 57	
Tapioca, 15 pounds	1 35	
Tea, 360 pounds	150 75	
Vermicelli, 5 boxes	5 88	
Vinegar, 83 gallons	21 84	
Yeast powders	18 00	
		\$7,151 52

*Salaries and Wages.*

Principal and teachers	\$9,995 39	
Physician, Clerk, and Matron	2,389 12	
Servants and services	4,322 86	
Gardener	358 50	
		\$16,965 87

*Clothing.*

Bark	\$ 85	
Blacking and brushes	22 00	
Boots and shoes, 79 pairs	166 50	
Buttons, needles, pins, and trimmings	6 52	
Clothes brushes	2 37	
Collars, paper, 1,800	19 00	
Combs	3 75	
Dress goods	14 20	
Dressmaker	2 25	
Flannel	1 15	
Hair brushes	3 25	
Hats	5 50	
Hose	5 40	
Knitting cotton and yarn	4 95	
Machine needles	1 00	
Machine oil	25	
Marking ink	2 25	
Merino shirts and drawers	20 00	
Nail brushes	2 25	
Neckties and bows	3 48	
Pants	9 50	
Repairing boots and shoes	173 80	
Ribbon	2 00	
Scissors	75	
Sewing silk	85	
Shirts, check	9 34	
Shoe laces	2 50	
Silesia	2 90	
Skirts	2 00	
Sponge	2 00	
Suits, thirteen	156 00	
Suspenders	6 00	
Tape	1 90	
Thimbles	2 00	
Thread and cotton	24 45	
Tooth brushes	2 75	
Worsted	1 85	
		\$689 51

*Furniture.*

Basket	\$1 00	
Bedsteads	80 00	
Bedroom sets	110 00	
Bellows	1 25	

Amounts carried forward: \$192 25 \$24,806 90

Amounts brought forward.....	\$192 25	\$24,806 90
Blankets.....	25 50	
Brackets.....	5 25	
Brass car knobs, six dozen.....	3 00	
Brooms, corn, 12 dozen.....	39 53	
Brooms, whisk, 4 dozen.....	8 05	
Bureau.....	3 50	
Carpets and lining.....	99 75	
Carpet cleaning.....	25 28	
Castors.....	2 15	
Chairs.....	90 00	
Clocks and repairing.....	5 00	
Coal hods.....	7 50	
Coal screen.....	8 00	
Coat and hat hooks, 2 gross.....	7 00	
Cornices.....	10 00	
Cotton mops.....	11 00	
Couch.....	20 00	
Crockery, glassware, and cutlery.....	106 25	
Curtain hooks.....	5 30	
Damask, table, 45 yards.....	44 69	
Door mats.....	4 73	
Dust brushes.....	13 50	
Dust pans.....	1 76	
Feather dusters.....	14 30	
Feather pillows.....	20 60	
Furnishing Principal's house.....	1,270 44	
Kitchen hardware and furniture.....	33 50	
Lamps and chimneys.....	13 40	
Leather.....	3 60	
Looking-glasses.....	10 25	
Matting.....	3 15	
Mattresses.....	114 00	
Mop handles.....	3 75	
Mosquito netting.....	59	
Molding.....	2 40	
Napkins, 6 dozen.....	12 79	
Pails, 2 dozen.....	5 25	
Piano.....	375 00	
Preserve jars, 3 gross.....	44 25	
Quilts.....	10 00	
Range plates and repairs.....	11 95	
Rubber castors.....	9 00	
Rugs.....	22 50	
Scrub brushes.....	6 00	
Sheeting.....	193 78	
Stools.....	6 00	
Stoves.....	7 75	
Table legs.....	8 25	
Tinware and repairs.....	31 85	
Towels.....	23 71	
Toweling.....	40 73	
Walnut.....	4 30	
Window shades and curtains.....	29 25	
Wire cloth.....	5 53	
Woodware.....	2 75	

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\$3,079 62

*Building and Repairs.*

Belting.....	\$2 35
Blinds, transoms, and doors.....	67 20
Cement.....	6 75
Copper wire.....	1 62
Door springs.....	3 50
Foot scrapers.....	1 00
Glass and putty.....	44 96
Glue.....	5 75
Hardware.....	117 59
Hose.....	12 45
Lard oil.....	4 50
Lime.....	4 50
Locks and hinges.....	19 38

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Amounts carried forward..... \$281 55 \$27,886 52

Amounts brought forward.....	\$281 55	\$27,886 52
Lumber.....	94 22	
Paints, brushes, and oils.....	15 70	
Painting.....	140 20	
Packing.....	2 63	
Plumbing, steam, and gas fitting.....	51 40	
Plumbers' supplies.....	29 00	
Red lead.....	50	
Sash cord.....	1 46	
Shingles.....	1 00	
Terra cotta pipe.....	2 80	
Varnish.....	4 00	
Wages of carpenter.....	880 00	
		\$1,514 46

*Fuel and Lights.*

Candles.....	\$2 80	
Coal, 154 $\frac{1395}{2240}$ tons.....	1,552 08	
Coal oil, 130 gallons.....	42 25	
Drop lights.....	2 35	
Freight and cartage.....	293 40	
Gasoline, 3,824 gallons.....	735 24	
Gas lighters.....	3 00	
Matches, 10 gross.....	18 50	
Wages of engineer.....	545 00	
		\$3,194 62

*Laundry.*

Bluing, 42 pounds.....	\$10 00	
Brushes.....	4 50	
Clothes pins.....	1 00	
Felting pipe.....	57 75	
Lard oil.....	9 50	
Lye.....	4 00	
Pan for furnace.....	5 00	
Sal soda, 494 pounds.....	9 89	
Soap, brown, 378 pounds.....	30 24	
Soap, powdered, 1,225 pounds.....	87 75	
Sperin oil.....	1 00	
Starch, 348 pounds.....	33 84	
Wages.....	968 00	
Wax.....	43 30	
		\$1,225 77

*Stable and Dairy.*

Barley, ground, 7,010 pounds.....	\$72 54	
Bran, 9,130 pounds.....	75 25	
Chamois skins.....	2 25	
Cracked corn, 7,596 pounds.....	99 66	
Currycombs and brushes.....	4 25	
Cutting and baling hay.....	48 50	
Harness and repairs.....	107 37	
Harness oil.....	4 10	
Hay, 15 tons.....	175 51	
Milk pails.....	2 00	
Oats, 6,593 pounds.....	116 33	
Oil meal cake.....	17 21	
Repairs to wagons.....	65 50	
Sponge.....	1 00	
Veterinary services.....	5 00	
Wages of stableman and dairyman.....	698 83	
Whips.....	3 50	
		\$1,498 80

*Miscellaneous.*

Barrow.....	\$13 00	
Bell.....	61 74	
Benzine.....	2 00	
Binding music books.....	3 75	
Blacksmithing.....	122 10	
Books, stationery, and school apparatus.....	245 38	
Cartage and wharfage.....	38 41	
Carving tools.....	2 25	
Car tickets.....	8 15	
Cash to pupils.....	24 40	
		\$521 18

Amounts carried forward.....	\$521 18	\$35,320 17
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Amounts brought forward.....	\$521 18	\$35,320 17
Christmas expenses.....	41 28	
Closet paper.....	21 00	
Diplomas.....	16 00	
Expenses of clerk to city.....	4 25	
Expenses of pupils to and from school.....	243 20	
Expenses of pupils to concert.....	5 00	
Expenses of boarding pupils.....	12 50	
Expenses of exchange on draft.....	1 00	
Expenses of pupils to oculist.....	3 50	
Expenses of picnic.....	11 90	
Express charges.....	53 95	
Fares.....	23 65	
Farm and garden implements.....	4 50	
Fly paper.....	2 50	
Freight on supplies.....	70 86	
Fruit wax.....	75	
Grindstone.....	4 52	
Hardware.....	76 37	
Honor rolls.....	11 66	
Horse keeping.....	24 50	
Insect powder.....	85	
Maple.....	1 68	
Medicines and drugs.....	142 16	
Mouse traps.....	50	
Music.....	19 77	
Picks and shovels.....	12 90	
Postage stamps.....	92 30	
Repairing and tuning pianos.....	77 50	
Repairing carriage and buggy.....	1 50	
Sand screen.....	12 00	
Seed grain, 1,310 pounds.....	19 65	
Seeds and plants.....	10 15	
Scales.....	50 75	
Silicon.....	4 00	
Stone hammers.....	2 15	
Squirrel poison.....	5 10	
Stove polish.....	1 23	
Subscription to D. and D. Annals.....	26 80	
Sweeping chimneys.....	6 00	
Swill cart.....	40 00	
Telegrams.....	41 64	
Telephones.....	100 00	
Tools for cabinet shop.....	2 00	
Traveling expenses.....	213 75	
Twine.....	2 65	
Use of roller.....	75	
Vaccine.....	8 00	
Wrappers.....	2 75	
Wrapping paper.....	4 57	
Overdraft, voucher 2,521.....		\$2,057 17
		30

*Official Expenses.*

Salary Treasurer and Secretary.....	500 00
Interest, collection charges, etc.....	497 13
Total current expenses.....	\$38,374 77

*Expenditures for Improvements.*

New kitchen ranges and furniture.....	\$469 45
Water, gas, and sewers.....	302 61
Improvement of grounds.....	1,803 52
	\$2,575 58
Total.....	\$40,950 35



# STATEMENT OF RECEIPTS AND DISBURSEMENTS FOR FISCAL YEAR ENDING JUNE 30, 1880.

## GENERAL FUND.

<i>Disbursements.</i>		
For salaries and wages .....	\$16,965 87	
For supplies .....	19,141 33	
For Treasurer's salary .....	500 00	
For miscellaneous expenses .....	497 13	
For new buildings of 1879 .....	469 45	
For water, gas, and sewers .....	302 61	
For improvement of grounds .....	1,803 52	
For furnishing Principal's house .....	1,270 44	
Advances by Union Savings Bank, July, 1879 .....	4,317 85	
		\$45,268 20
<i>Receipts.</i>		
From State treasury, appropriation for support .....	\$33,000 00	
From Principal .....	2,648 09	
From State treasury, appropriation for deficiency, 1879 .....	8,532 00	
		44,180 09
Deficiency .....		\$1,088 11

## BUILDING FUND.

Amounts received from State treasury on account of appropriation .....	\$40,000 00
Amounts disbursed on erection of buildings .....	14,412 63
Cash on hand .....	\$25,587 37

H. A. PALMER, Treasurer.

## LIST OF PUPILS IN THE INSTITUTION SINCE JULY 1st, 1879.

NAMES.	Towns.	Counties.
<i>Deaf and Dumb—Males.</i>		
Aldersley, Lyell .....	Napa City .....	Napa.
Aronsohn, Martin .....	San Francisco .....	San Francisco.
Best, William C. ....	Suisun .....	Solano.
Billings, Charles W. ....	Oakland .....	Alameda.
Black, Joseph French .....	Pleasanton .....	Alameda.
Bucking, George F. ....	San Francisco .....	San Francisco.
Butler, Louis L. ....	Halleck Station .....	Elko, Nevada.
Cator, Azro A. ....	West Berkeley .....	Alameda.
Christeen, Frederick W. ....	Sacramento .....	Sacramento.
Christenson, Lewis O. ....	Hollister .....	San Benito.
Cohn, Max. ....	San Francisco .....	San Francisco.
Connelly, John .....	San Francisco .....	San Francisco.
Collischonn, Fred .....	Oakland .....	Alameda.
Coulter, Charles B. ....	San Andreas .....	Calaveras.
Cushman, Ira D. ....	Georgetown .....	El Dorado.
DeWolf, Joseph .....	San Francisco .....	San Francisco.
Dickerson, Benjamin F. ....	Millville .....	Shasta.
Dinsmore, Bruce .....	Colfax .....	Placer.
Dobner, Harry .....	San Francisco .....	San Francisco.
Egan, William .....	San Francisco .....	San Francisco.
Ewing, William .....	Walla Walla .....	Washington Territory.
Funkenstein, Leon .....	San Francisco .....	San Francisco.
Gard, Peter .....	Brown's Valley .....	Yuba.
Gee, William .....	Gibsonville .....	Sierra.

## LIST OF PUPILS—Continued.

NAMES.	Town.	Counties.
Goodrich, Doney H.	Volcano	Amador.
Grady, Theodore	San Francisco	San Francisco.
Gross, Chas. A.	Stockton	San Joaquin.
Hannah, Andrew Milligan	San Francisco	San Francisco.
Harding, Josh. G.	San Francisco	San Francisco.
Hatton, Jr., John S.	Napa City	Napa.
Hill, Eldridge B.	Santa Barbara	Santa Barbara.
Holman, Willis G.	Linden	San Joaquin.
Johnson, James H.	Woodland	Yolo.
Lake, Frank	Santa Cruz	Santa Cruz.
Lambert, Norman	Carpenteria	Santa Barbara.
Lewis, Beverly	Tracy	San Joaquin.
Lohmeyer, Edward W. F.	San Francisco	San Francisco.
Lynch, William Holden	Paicines	San Benito.
Mast, Herman X.	San Francisco	San Francisco.
McClure, William C.	Unionville	Humboldt, Nevada.
McCormick, Francis	Sonora	Tuolumne.
McMillan, Charles	San Francisco	San Francisco.
Moesser, George E.	Santa Ana	Los Angeles.
Oldham, William G.	Santa Rosa	Sonoma.
Olivas, Dolores	Santa Barbara	Santa Barbara.
O'Rourke, James P.	San Francisco	San Francisco.
Poyser, Harry	San Francisco	San Francisco.
Price, Edmund M.	Salinas City	Monterey.
Rahmstorf, George Henry	Midway Station	Alameda.
Raymond, Harry L.	Oakland	Alameda.
Redman, William W.	Willitsville	Mendocino.
Redmond, Grenville S.	San José	Santa Clara.
Reichsrath, Charles	West End	Alameda.
Rhorer, Joel Neal	South Vallejo	Solano.
Rosenbaum, Nathan	San Francisco	San Francisco.
Saltenberger, George	San Francisco	San Francisco.
Schilling, William	San Francisco	San Francisco.
Schlam, Solomon	San Francisco	San Francisco.
Schreiner, Henry	Freeport	Sacramento.
Selig, Isadore	San Francisco	San Francisco.
Selig, Kossuth	San Francisco	San Francisco.
Shoaf, George Anton	Virginia City	Storey, Nevada.
Sievers, Charles	San Francisco	San Francisco.
Smith, Ellsworth	Riverside	San Bernardino.
Stewart, Francis F.	Wilmington	Los Angeles.
Sullivan, Torrence W.	San Francisco	San Francisco.
Taber, Henry W.	Gibsonville	Sierra.
Williams, Leo	San Francisco	San Francisco.
Willits, Joshua M.	Carson City	Ormsby, Nevada.
Wood, Edgar	Woodville	Tulare.

*Deaf and Dumb—Females.*

Awbrey, Eliza Bell	Red Bluff	Tehama.
Ayers, Dora	Stony Point	Sonoma.
Booth, Meta M.	Pope Valley	Napa.
Botto, Orelia	Sutter Creek	Amador.
Bradley, Arrenia	Lewiston	Trinity.
Bradley, Catherine	Lewiston	Trinity.
Cronin, Ellen	San Francisco	San Francisco.
Darling, Sarah F. J.	Bear Valley	Mariposa.
Decker, Delia	Chico	Butte.
Defrees, Mary Alice	Sacramento	Sacramento.
Deguey, Margueritte	Saint Helena	Sonoma.
Doren, Theresa	San Pablo	Contra Costa.
Durkee, Mary Louisa	San Francisco	San Francisco.
Emry, Francis Ellen	Chico	Butte.
Ford, Catherine	San Francisco	San Francisco.
Funkenstein, Paulina	San Francisco	San Francisco.
Gassagne, Adela	Los Angeles	Los Angeles.
Gilbert, Angele	San Francisco	San Francisco.
Goss, Nancy Jane	Downey City	Los Angeles.

## LIST OF PUPILS—Continued.

NAMES.	TOWN.	Counties.
Halloran, Maggie	Birds Landing	Solano.
Horrock, Lizzie	San Francisco	San Francisco.
Johnson, Lucy M.	San Francisco	San Francisco.
Kiddell, May Grace	Sacramento	Sacramento.
Kuffell, Wilina E.	Bloomfield	Solano.
Lewis, Josephine	Tracy	San Joaquin.
Lucas, Maggie	Woodland	Yolo.
Madigann, Emma Jane	Mayfield	Santa Clara.
McLaughlin, Sophie	San Rafael	Marin.
McTigue, Augusta	San Francisco	San Francisco.
Munson, Mary Elizabeth	Eureka	Humboldt.
Müth, Elizabeth	San José	Santa Clara.
Peralta, Mary	Wickenburg	Arizona.
Porter, Fannie E.	Turlock	Stanislaus.
Ross, Nellie	Napa City	Napa.
Schietz, Mathilda	Los Angeles	Los Angeles.
Sieferman, Louisa	Woodland	Yolo.
Sieferman, Emilie	Woodland	Yolo.
Thorpe, Charlotte C.	San José	Santa Clara.
Uhl, Anna M.	San Francisco	San Francisco.
Vallejo, Camila	Napa City	Napa.
Warren, Annie	Wilmington	Los Angeles.
Wallace, Gertrude J.	San Francisco	San Francisco.
Wright, Honorah Catherine	San Francisco	San Francisco.
<i>Blind—Males.</i>		
Calvert, George	San Francisco	San Francisco.
Catoir, Jacob	San Francisco	San Francisco.
Dodds, Orrin	San Francisco	San Francisco.
Durham, John Oliver	San Francisco	San Francisco.
Foley, Dennis	San Francisco	San Francisco.
Hodgson, Joseph	Sherlock	Mariposa.
Jackson, Stephen	San Francisco	San Francisco.
Loucks, Gideon R.	Santa Rosa	Sonoma.
Martin, Clement P.	Vallejo	Solano.
Nagle, Harry M.	Oakland	Alameda.
Orth, Louis	Sacramento	Sacramento.
Smith, Cecil H.	Oakland	Alameda.
Staggs, William A.	Denver	Solano.
Towle, William H.	San José	Santa Clara.
Weider, Daniel, Jr.	Oakland	Alameda.
<i>Blind—Females.</i>		
Alderson, Clara C.	Oroville	Butte.
Clement, Catherine	San Francisco	San Francisco.
Dalton, Nellie A.	Vallejo	Solano.
Fennel, Anna	San Francisco	San Francisco.
Foley, Catherine	San Francisco	San Francisco.
Haggerty, Caroline	San Francisco	San Francisco.
Haney, Louise	Bath	Placer.
Hardin, Nannie	Petaluma	Sonoma.
Levi, Nathalie	San Francisco	San Francisco.
Logan, Elizabeth O.	Penryn	Placer.
Mast, Emma L.	San Francisco	San Francisco.
Morrison, Margaret E.	Oakland	Alameda.
Morton, Lulie	Grangeville	Tulare.
Penny, Ada	San José	Santa Clara.
Perrot, Ella	Sacramento	Sacramento.
Roth, Katie Lena	Sacramento	Sacramento.
Tenney, Mary Anne	San Francisco	San Francisco.

## TERMS OF ADMISSION.

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The California State Institution for the Deaf and Dumb and the Blind is located at Berkeley, about four miles north of the City of Oakland. Between San Francisco and Oakland a steam ferry plies almost every half hour in the day, and from the latter city a horse railroad is constructed, which lands passengers within easy walking distance of the institution.

*First*—The institution offers its benefits to all deaf and dumb or blind persons who are of age suitable for instruction, and who are of sound intellect, and free from vicious habits and contagious or offensive diseases.

*Second*—No charge is made for pupils from this State, except for clothing and traveling expenses.

*Third*—Pupils from other States or Territories are charged three hundred dollars per annum, payable quarterly in advance. No deduction is made from annual charge, on any account, except in cases of prolonged sickness.

*Fourth*—The session begins on the fourth Wednesday of August, and closes the second Wednesday of June. Parents are earnestly requested to enter, or return their children, promptly at the beginning of the term. Only in extreme cases will the pupils be permitted to leave before school closes.

*Fifth*—Pupils should be provided with comfortable clothing when they enter the institution, and their wardrobe renewed twice a year.

*Sixth*—All moneys designed for pupils should be placed in the hands of the Principal, to whom, also, all letters of inquiry, etc., should be addressed.

Parents or guardians of applicants for admission, are requested to furnish written answers to the following questions:

1. What is the name of the applicant?
2. When and where was he born?
3. Is his deafness or blindness from birth; or is it from accident or disease? If so, at what age and from what cause did he become so?
4. Is his deafness or blindness total or partial? If the latter, what is the degree of hearing or sight?
5. Have any attempts been made to remove his deafness or blindness; and if so, what are the results?
6. Are there any other cases of deafness, blindness, insanity, or idiocy in the same family, or among the collateral branches of kindred? If so, how and when produced?
7. Was there any relation between parents or grandparents before marriage?
8. Has the child had the small-pox, scarlet fever, measles, mumps, whooping cough? Has he been vaccinated?
9. What are the names, nationality, occupation, residence, and post office address of parents?
10. What are the number and names of their children?

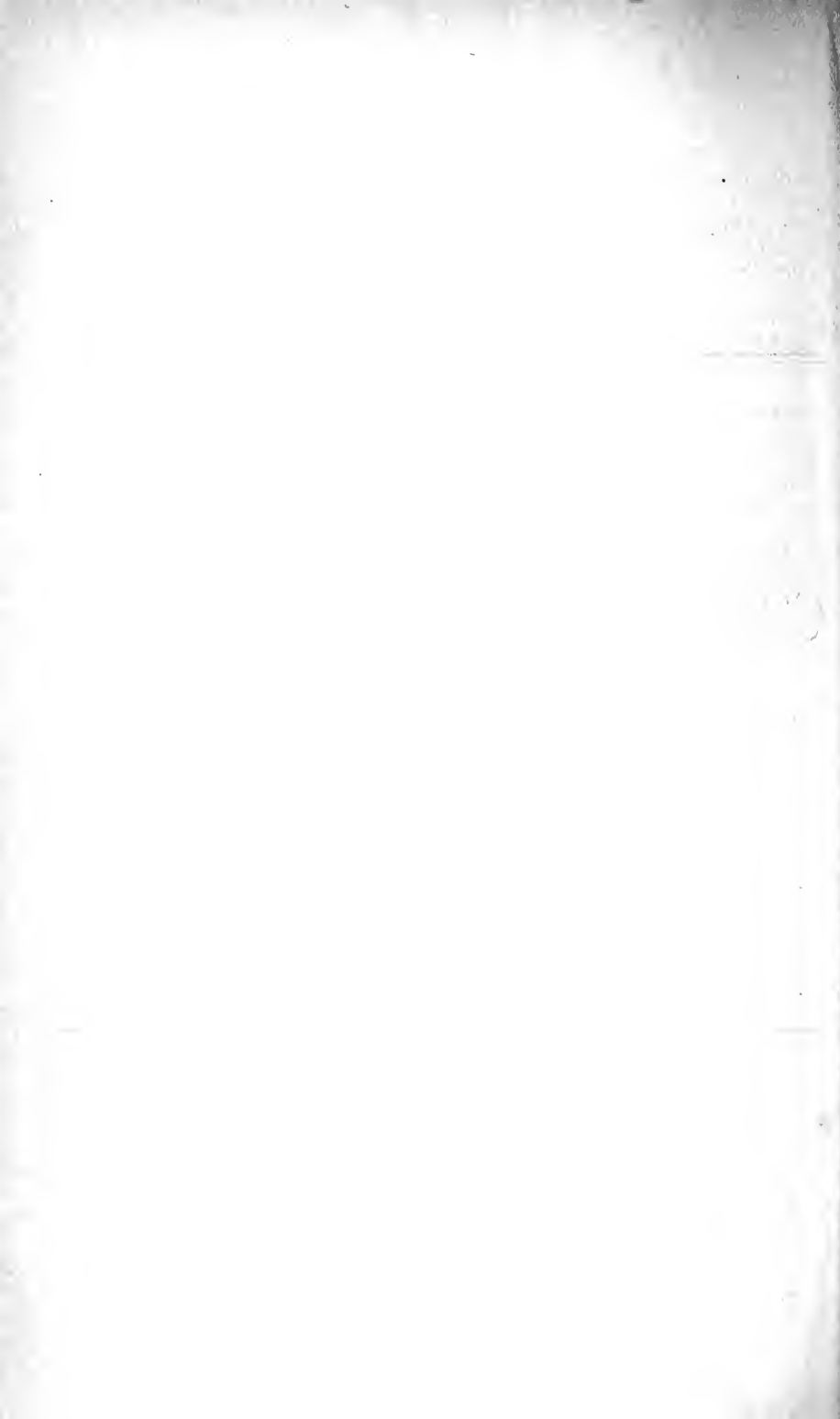
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REPORT  
OF THE  
COMMISSIONERS OF FISHERIES  
OF THE  
STATE OF CALIFORNIA,  
FOR THE  
Year 1880.

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# REPORT.

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*To his Excellency* GEORGE C. PERKINS, *Governor of California:*

The Commissioners of Fisheries for the State of California, appointed under an Act of the Legislature entitled "An Act to provide for the restoration and preservation of fish in the waters of this State," approved April 2, 1870, respectfully submit their sixth report.

Heretofore reports of the transactions of the Fish Commissioners have been made biennially, at the meeting of each Legislature. The change in time for submitting a statement of our operations, required by the adoption of the new Constitution, necessarily limits this report to the proceedings of the past year.

## SACRAMENTO SALMON—ONCORHYNCHUS QUINNAT.

It is with pleasure we report that the annual hatching of two millions of these fish, and placing them in the tributaries of the Sacramento River, are producing their legitimate results. The numbers of salmon that could have been taken in this river, before the greater part of their spawning beds had been destroyed by sediment from the gold mines, can never be known. It is the testimony of all the pioneer miners that every tributary of the Sacramento, at the commencement of mining, was, in the season, filled with this fish, hurrying and struggling as if to reach the very sources of these streams. A few salmon continued to enter the Feather, Yuba, Bear, and American Rivers until the floods of the Winter of 1860-1, which covered the gravel bottoms of all those streams with mining sediment, and thereby destroyed their spawning grounds. Continuous and unrestricted fishing, and the destruction by mining of so large an area of clean beds of gravel, reduced this fish in numbers in the Sacramento until, in the season of 1872 and 1873, there were probably less than at any other time before or since. Several thousands of young fish, artificially hatched, were placed in the head waters by the United States prior to 1873. In that year we made arrangements with the United States authorities to hatch our quota of the eggs annually given to each State, at an expense of \$1,000 for each million of fish hatched out and turned into the river. Including 2,225,000 fish just placed in the head waters, there have been hatched by the State, and turned into the McCloud, Pit, and Upper Sacramento Rivers, 15,350,000 young salmon.

It seemed desirable that a record should be kept of the catch of salmon in the Sacramento, so as to learn the effect on this industry of the annual deposit of these two million young salmon.

Since 1874 we have obtained the numbers and weight of salmon

caught in the Sacramento and San Joaquin, that have been transported from the place of capture, to the Cities of San Francisco, Sacramento and Stockton, by rail and steamboats, as also the numbers and weight of salmon put up in tins by the different canning establishments. We have been unable to obtain the weight of salmon salted, and the numbers and weight of salmon caught near the mouth of Feather River, and by the fishermen near Tehama, and in the upper waters of the Sacramento and San Joaquin. Neither can we obtain the numbers and weight of those taken to market by fishermen in their own boats, nor those caught and salted, in violation of law, during the close season. Therefore, to the weight of salmon actually taken to market by rail and steamboats, and the salmon actually tinned, we have added twenty-five per cent., the total being a close approximation of the actual catch for the season.

This system has been pursued since we commenced in 1873, to gather the statistics of the catch of salmon in the Sacramento River. The record is as follows:

For season ending August 1, 1875.....	5,098,781 pounds.
For season ending August 1, 1876.....	5,311,423 pounds.
For season ending August 1, 1877.....	6,493,563 pounds.
For season ending August 1, 1878.....	6,520,768 pounds.
For season ending August 1, 1879.....	4,422,250 pounds.
For season ending August 1, 1880.....	10,837,400 pounds.

In the season, ending August 1, 1879, the salmon were reported to be as numerous as ever before known, but for three weeks, during the height of the season, in consequence of a disagreement between the fishermen and the proprietors of canning establishments, no salmon were taken, except for daily consumption in the city markets. It will be seen that the catch of 1880 was the largest ever reported, and that the weight of salmon captured has doubled since the State's appropriation enabled us to place annually an average of two million young fish in the head waters of the Sacramento. The fishermen, as well as the proprietors of canning establishments, are beginning to acknowledge that the annual addition of two million young fish to the river, over and above those naturally hatched, does, after two or three years, add to the numbers of mature fish to be found in the river.

More young fish have been taken by the fishermen, during the past two years, than ever before; and more young fish have appeared on the spawning beds of the McCloud, during the same period, than have heretofore been observed.

The increase in the numbers and weight of fish taken, and the immense numbers of young fish that reach the spawning grounds from the ocean, are conclusive evidence that the expenditure, by the State, of money, in the artificial hatching of salmon, is a most profitable investment for the public benefit. The increase of fish, by artificial propagation, has doubled the annual catch of salmon in the river, correspondingly added to the numbers of men and boats engaged in the industry, and warranted the investment of not less than \$300,000 in the erection and equipment of salmon canning establishments.

When the State commenced the work of artificially hatching salmon, and placing the young fish into the head waters of the rivers, there were no canning establishments on the Sacramento River. Now, on the river, and in the cities, there are nine. The State



appropriation for fish hatching may be said to have created this industry. To show with what rapidity this business is growing, it may be stated that in 1879 there were tinned, of Sacramento River salmon, 33,017 cases of forty-eight pounds each, or 1,584,816 pounds. In 1880 there were tinned 62,000 cases of forty-eight pounds each, or 2,976,000 pounds.

The average catch of salmon in the rivers, before the State added to the numbers by artificial hatching, was five million pounds. This, to persons not controlled by narrow personal interest or cupidity, would be convincing evidence of the wisdom of the State laws for the promotion and increase of this industry. Yet, strange as it may seem, it is the history of the fish industry of every State in the Union, and of all other countries, that when public moneys are used to add to the numbers of fish to be caught, not only the fishermen, but the owners of large capital invested in the business, are unremitting and persistent in their applications for the repeal of all laws that place any restriction upon unlimited fishing. The perpetuation of the salmon industry is absolutely dependent upon the fact that some of the fish must be allowed to pass the nets and reach their spawning grounds at the head waters. It is only at the sources of streams, and under the conditions there found, that the eggs will naturally develop into fish. It is only when the fish reach their spawning grounds that their eggs have become sufficiently matured so that they may be taken for artificial propagation. These facts are well known and undisputed, yet the Legislature is biennially besieged to repeal the law, or to so change it that practically there shall be no limit to fishing while there is a fish to be found in the river.

From the report of Mr. H. D. Dunn, who, in gathering statistics of the weight of salmon tinned from the Sacramento, may be learned the views of the gentlemen engaged in the salmon canning business. It will be seen that they also, with the fishermen, practically ask a repeal of the law which now allows some of the fish to reach their spawning grounds. They claim that if all nets were removed from the river from Saturday noon until Monday morning of each week, this would allow a sufficient number of fish to pass. They also assert that the present law (except by the canneries) is violated. They, however, neglect to state that if the close season were changed to suit their views, and increase the profits of their business, they would hardly stop to inquire, on Monday morning, whether the fish brought to them were caught on that morning or on Sunday.

Many changes have been made by succeeding Legislatures in the time for a close season for salmon. Every concession is taken as a basis for further changes, looking to the present profits of the fishermen and canners. Neither the fish, the public, nor the future of the business appears to have many friends. Any restrictions upon unlimited fishing and unlimited canning, while a fish can be found in the river, is looked upon as a personal injury, inflicted by a meddlesome and tyrannical government.

Under the present law the fish have so increased that the annual catch has more than doubled. Although the law is violated by many fishermen, yet the canning proprietors have so much capital invested that they fear to violate the law by canning fish out of season. Their obedience compels a partial observance of the law on the part of the fishermen. When the canneries cease work, as required by the present law, fish are usually quite numerous in the river. During

the close season no salmon are sold in the city markets, the canneries dare not purchase, and the greater number of fishermen cease work. A few, determined to oppose any law, still continue to draw their nets, and salt the catch in by-places among the tule islands. At this season the fish are gravid and unfit for food, and whenever canned or salted in this condition and sold, they injure the character, in the markets of the world, of all the fish shipped from the river where such fish are attempted to be utilized. On the Columbia River, without any requirement of law, the canners cease work on the first of August, not because there are not fish still to be taken, but because they are over ripe. They have found that the tinning of over ripe fish injures the reputation and lowers the standard of the whole season's work. The standing of the tinned salmon of the Sacramento would have been as high, in foreign markets, as that of the rivers of Oregon had not the greed of a prominent canning firm induced them, at the commencement of their business, to tin over ripe fish.

We desire to add that the present law for a close season may lessen immediate profits, but it perpetuates the business, leaves fish for those who will succeed us, compels a high standard for Sacramento salmon, makes this fish almost the cheapest food in the State, and is for the best interest of the public, who are taxed to keep up and increase the numbers of fish in the rivers.

The report of Mr. H. D. Dunn, which follows, in addition to the statistical information which it contains, also gives fully the views of the proprietors of the canning establishments, which, as heretofore, will be urgently pressed upon the attention of the Legislature. In reply to these requests so plausibly stated, we have to repeat, if salmon are to be continued in our rivers, a large number of the fish must be allowed to reach their spawning grounds, not accidentally or by chance, but systematically, and by design. The fishermen will not cease fishing Sundays while there are canners to buy all that may be brought Monday morning. Therefore, as at present, the canneries should cease work during a few weeks of the time after the fish have come in from the ocean, and are on their urgent errand to their spawning beds.

SAN FRANCISCO, CALIFORNIA, December 21, 1880.

*To Board of California State Fish Commissioners, San Francisco, California:*

GENTLEMEN: From inquiries made of parties engaged in the business, I learn that there has been packed at the canneries on the Sacramento River and in this city about 62,000 cases of salmon, of four dozen one-pound tins each. All these salmon were taken from the waters of Suisun Bay and the Sacramento and San Joaquin Rivers. These salmon averaged about twelve pounds each when taken.

There were also packed in Smith's River, in this State, during the present year, 7,500 cases salmon of four dozen one-pound tins each, and five hundred barrels salted down.

There were also packed in Eel River, in this State, about 6,250 cases salmon of four dozen one-pound tins each, and as far as can be estimated, about 1,500 barrels salted down. The salmon in both these rivers are reported to have averaged about ten pounds weight each when taken.

A new feature this year was the engaging in the business in this city of four fruit canning establishments, viz.: Chas. King, of Wm. & Co., A. Lusk & Co., Emerson, Corville & Co., and the Cutting Packing Company. A portion of the fish canned by these firms was purchased at the wharves in this city, and the others of fishermen on the Sacramento River.

During the open season, the run of salmon in the Sacramento River was very large, being in excess of any previous year known. The supply taken by the fishermen at times being in excess of the wants of the canneries, the surplus fish were brought to San Francisco for sale, many spoiling and being thrown into the bay.

After the expiration of the close season (September 15th), the run of salmon was extremely large, but lasted for about ten days only, during which, on the 15th, 16th, and 17th of Septem-

ber, it was estimated that fully nine thousand fish were thrown back into the river, thus wasted, for want of purchasers.

An unusual circumstance, this season, connected with fishing on the Sacramento River, has been a large run of salmon during the present month (December), boats averaging from forty to fifty fish per day, when from five to ten were the catch in prior years. As the canneries are all closed, and an abundant supply salted for the present year, a very large number of these salmon will probably reach their spawning grounds, at the head waters of the Sacramento River.

During the close season, between August 1, and September 15, the law was openly violated by the fishermen, who defied arrest and conviction for the offenses. The few persons who were arrested were taken to Suisun City, Solano County, where no conviction could be had, it being stated that public opinion there was adverse to the law. That the close season was openly and persistently violated by the fishermen on the Sacramento and San Joaquin Rivers was a matter of notoriety, and parties, well informed, stated that the number of salmon taken, in violation of law, and salted and smoked, was in excess of those supplied to the canneries and city markets, during the legal season. As an illustration of the large number thus taken, a person of credibility, engaged in the canning business, stated to me that he knew of two fishermen (owning one boat between them) selling, since the close season expired, two hundred barrels salted salmon, which is equal to four thousand salmon, or more than the united catch of three average boats before August 1.

Another party informed me that salmon were taken frequently in sight of Collinsville on the Sacramento River, and also in the San Joaquin River, during the close season, in daylight, without any attempt at concealment. The same person stated that he saw lying on the wharf at mid-day, during the close season, at Webb's Landing, on the San Joaquin River, from five hundred to six hundred salmon, the fishermen cleaning and salting the same, regardless of who might see them.

Though the price of salmon ruled low (from one dollar and five cents to one dollar and ten cents per dozen) all the canneries in this State, except one at Black Diamond Landing, Contra Costa County, were actively employed during the past season. The canneries were as follows: One each, Washington, Courtland, Chipp's Island, Smith's River, and Eel River; two at Collinsville, and four in San Francisco—eleven in all employed. From what I can learn, a similar number will probably be employed during the coming season, action having already been taken for that purpose. A canning factory at Benicia, during 1881, is also among the probabilities. Unforeseen adverse circumstances excepted, it seems probable that more salmon will be canned in this State during 1881 than in any previous year, as should the catch justify it, other canneries in this city may engage in the trade. The city canneries have greater advantages, they employing skilled labor continuously during the larger portion of the year, while the time of the canneries on the rivers is not only limited, but is broken by the close season, after which it is difficult to engage workmen for so few days work as the run of fish may last.

As all information connected with the taking of salmon is of interest to the Commissioners, I deem it right to advise you of the feeling of canners with whom I have conversed, regarding the present law of this State. These parties complain that the six weeks' close season in the height of the run of salmon puts them to large additional expense, as compared with the canners on the Columbia, and other salmon rivers north; that at present, on the Sacramento and San Joaquin Rivers, the canneries have a supply of salmon for about six weeks only, as during the greater part of June and July the run is very uncertain; during which, they have to be at the same expense as if there was full work for their employés; that nothing is saved to the State by the close season, as salmon are taken in large quantities by the fishermen, in defiance of the law; that the fishermen, after having gone to the expense and labor of salting the salmon so taken, receive a less price for them than what would be paid them if it were lawful to sell them to the canneries; that while the canneries pay thirty-five cents for the fish delivered to them, the fishermen sell their salted salmon, delivered in this city, at from fifteen to twenty-five cents each; that allowing for salt, labor, and freight, the salted salmon net the fishermen from ten to fifteen cents, instead of thirty-five cents paid at the canneries.

The canners claim that while the present law against taking salmon in the close season is a dead letter, from inability to enforce it, that modifications can be made for their benefit without injury to the best interests of the State. Their desire is to have the close season for taking salmon limited to thirty-six hours each week, extending from Saturday noon to Monday morning, claiming that this time being observed, sufficient spawning fish will reach the head waters of the Sacramento River to furnish all the eggs required to keep up the supply. They ask that this may be done, pledging themselves to aid in enforcing the law, which they will be able to do by refusing to take any fish taken during the close time; that if this change is made, and the result is not satisfactory, after trial, to the Commissioners, they, the canners, will not oppose a reenactment of the present law, if the former desire it. To aid in keeping up the supply of salmon, the canners propose to have all the boats taking salmon licensed, and if need be the canners also; that the sum so collected be paid to the Fish Commission as a fund to be expended in hatching out salmon to keep up the supply; that the boats being licensed will keep out poachers, who will be easily detected if the licensed boats are properly marked with large figures to insure identification; that at the present time all fishing boats being of the same model, and painted of the same color, it is practically impossible to identify them, and they can be and are loaned to other parties who violate the law without liability to confiscation.

I have taken the liberty of writing thus fully the views of the canners, so that the Commissioners may be advised of the same before the meeting of the State Legislature, next month.

Also, that if it should be desirable to have the canners explain their views more in detail, the Commissioners could meet them for that purpose and thereby be able to devise, if possible, some united action by which the fishing interests of the State would be increased.

I am, yours truly,

HORACE D. DUNN.

The following statement shows the numbers of salmon transported by rail and steamers from the fishing grounds of the Sacramento and San Joaquin to the Cities of San Francisco, Sacramento, and Stockton, from September 15, 1879, to August 1, 1880. It is to be regretted that some of the transporting companies do not keep the numbers and weight of sturgeon separate from those of the salmon. It is, however, thought that the numbers and weight of sturgeon were not in excess of previous years. It is also to be regretted that in one instance the numbers of salmon had to be approximated, in consequence of carelessness in making the necessary entries:

#### SUMMARY.

Shipments per steamer Enterprise.....	40,829
Shipments per steamer Julia.....	24,661
Shipments per steamer Chin-du-Wan.....	2,276
Shipments per steamer Modoc.....	1,729
Shipments per California Transportation Company.....	70,354
Shipments per Stockton line (estimated).....	34,547
Shipments per rail to Oakland.....	13,750
Shipments per rail to San Francisco.....	150
Total numbers.....	188,296

While gathering the statistics of the cases of Sacramento salmon canned during the past year, Mr. Dunn procured the following statistics of salmon canned in Oregon, etc., the present season, which is also of interest:

On the Columbia River, 512,000 cases.....	4 dozen 1-pound tins each.
On the Fraser River, 40,000 cases.....	4 dozen 1-pound tins each.
On the Skeena, and other rivers, 21,000 cases.....	4 dozen 1-pound tins each.

Besides the foregoing, there were canneries in operation at Sinslaw and Rogue Rivers, Oregon; Puget Sound, Washington Territory; Prince of Wales Island, and Sitka, Alaska Territory, the catch of which he has been unable to obtain.

Under wise laws and small appropriations the salmon industry of California has doubled in five years. With a more faithful observance of the present laws, it can be doubled again in another five years. It would seem to be wise policy for the Legislature to disregard the appeals of even good citizens, whose judgments are liable to be wrested by their present personal profits. The Fish Commissioners stand between the general good of the public and private interests, and look to the Legislature, as representing the intelligence of the whole community, to sustain them in their efforts to foster, advance, and increase a great industry.

#### SHAD—ALOSA SAPIDISSIMA.

On the 18th of June, 1880, we received from the United States Fish Commissioner, a donation of 240,000 young shad, which arrived without loss, and were placed in the Sacramento River at Tehama. This makes in all 640,000 of these fish that have been placed in

this river, through donations from the United States Fish Commissioner, and through importations by the State. These fish are now increasing by natural propagation, as fish of all ages are caught in the river, and in the salt water of the Bay of Monterey. A few years since, when mature shad first made their appearance, they sold for \$1 50 per pound. They now sell for twenty and twenty-five cents per pound. They are as regularly quoted in the market reports as any other fish common to the waters of this State. Relatively to the numbers in our waters, more shad are caught in California than on the Atlantic Coast.

When the shad, after spawning, leave the eastern rivers they disappear and rarely, if ever, are taken in the ocean. Practically, they are only caught for market after entering the rivers. The shad turned into the Sacramento, when the time comes for them to leave the river, resort in large numbers to the Bay of Monterey, about one hundred miles south of San Francisco, where they find an abundance of food and remain until the procreative instinct compels them again to enter the river. Shad are caught at all seasons in the Bay of Monterey, in the nets of the fishermen while fishing for other fish. There is, therefore, no week during the year when shad cannot be found on the stalls in the San Francisco market. Looking to the natural increase of the fish, this is unfortunate, as it will require largely increased importations to fully stock our waters. When our rivers are fully stocked, now that the habits of this fish on our coast are known, there will be no difficulty in procuring this valuable fish at all seasons of the year.

Professor Baird, of the United States Fish Commission, is having constructed a railway car, to be solely used in the transporting of fish. When completed, he proposes to send in it two or three million young shad, which he believes will fully stock the Sacramento and San Joaquin Rivers, and eventually all the appropriate waters of this coast. We are entirely satisfied with the result of the experiments thus far made in importing and planting shad in the waters of California.

#### WHITE FISH—COREGONUS ALBA.

The 565,000 white fish, the eggs of which were brought from Lake Michigan, and planted in different lakes and streams of this State, appear to be thriving and increasing. We hear of them being occasionally taken. As they can only be successfully caught in nets made for the purpose, and rarely are taken with the hook, the probabilities are they will become very numerous before the fishermen will make a business of their capture. They are so valuable and highly esteemed fresh water fish that we shall make every effort to fully stock all our accessible mountain lakes. We have asked the United States Commissioner of Fisheries for a consignment of 250,000 of the eggs of this fish, to be hatched at the State's hatching house at San Leandro, for distribution during the present Winter.

#### SCHUYLKILL CATFISH—AMIURUS ALBIDUS.

The seventy-four catfish imported from the Raritan River, in 1874, have increased and multiplied, and this increase distributed, until now, we believe, there is no county in the State, from Del Norte to

San Diego, that has not been supplied with a greater or less number of these fish. They are regularly sold in all the markets, at the same prices as our most abundant fish. They are admirably adapted to the sloughs and warm waters of the great valley, and in them have so multiplied as to furnish a large supply of food. The aggregate value of this fish alone, sold in the markets of San Francisco and Sacramento annually, would more than equal the appropriation annually made by the State for fish culture. How constant has been the demand made upon us for the wide distribution of this fish, may be seen in our report of expenditures, which shows quite a large amount paid for their capture, and in sending them by express to different parts of the State. These fish are now so numerous and widely distributed that probably the time has arrived when their further distribution should be left to private enterprise, and the money of the State heretofore used for this purpose be employed in importing some other equally valuable fish.

#### CARP—CYPRINUS CARPIO COMMUNIS.

Since the date of our last report, we received from Professor Baird, at the Government carp ponds, in Washington, three hundred young carp of the most valuable variety. They were brought to California with the loss of but two. Sixty were placed in a public lake near Sacramento; the remainder were placed in the private pond of R. R. Thompson, in Alameda, who promised to protect them, and allow the State to remove them and their increase whenever desired. We have no report of those placed in Sutterville Lake; probably none of them have been caught. Those placed in the private pond at Alameda are doing well. These fish were hatched from the egg in June, 1879. When they arrived in this State, December 29, 1879, they averaged about two inches in length. In June, 1880, one year from the time they had left the egg, they had grown to a length of more than eight inches. During the latter month, at the request of Professor Baird, United States Fish Commissioner, we caused the pond to be netted, and of the carp taken, forwarded one dozen to the ponds at Mare Island, the Navy Department having expressed a desire that the ponds at this Navy Yard should be stocked with the most valuable variety of carp. The great increase in the size of the fish, and their fine appearance, make it certain they have found congenial homes. They were probably too young to have spawned last year. They will, without doubt, produce young fish during the Summer of 1881. When the young fish are ready for distribution, we shall take measures to distribute them to all the appropriate waters throughout the State.

The eight carp, of another variety, brought to this State in 1872, from Hamburg, by the late Mr. A. J. Poppe of Sonoma County, increased largely, and have been widely distributed. Wherever planted in our waters they have grown rapidly, and multiplied in numbers. No other variety of fish have so long been under the care and protection of man, and no other seems so capable of domestication. There appears to be a wide spread desire among farmers of this State, who have small natural or artificial ponds or sloughs on their land, to procure carp for stocking their waters. Although the carp belonging to the State have not yet produced any increase, and as it is not probable any of the young of this fish can be ready for

distribution before the Winter of 1881, yet we have already on file twenty-three applications for the young of this fish from farmers in seventeen different counties. The carp will certainly thrive in all the interior waters of the State, with the possible exception of the lakes near the summit of the Sierra Nevada, where the water in Summer may be too cold. The carp furnishes so large a supply of food to the people of Europe and Asia, and promises to be of so much value to the people of this State, that we condense from the report of Mr. Rudolph Hessel to Professor Baird, the following information of the habits and natural history, etc., of this fish. He says: The carp is partial to stagnant waters, or such as have not a too swift current, with a loamy, muddy bottom, and deep places covered with vegetation. It is able to live in water where other fishes could not possibly exist—for instance, in the pools of bog meadows and sloughs. It lives upon vegetable food, as well as upon worms and larva of aquatic insects, which it turns up from the mud with the head; it is very easily satisfied, and will not refuse the offal of the kitchen, slaughter-houses, and breweries, or even the excrement of cattle and sheep.

In central Europe, where the water of the carp ponds becomes very cold, the fish will, at the beginning of the cold season, seek deeper water, making holes in the mud, where they pass the Winter in a kind of sleep. They make a cavity in the muddy ground, called a "kettle." In this they pass the time until Spring, huddled together in concentric circles, with their heads together, the posterior part of the body raised, and held immovably, scarcely lifting the gills for the process of breathing, and without taking a particle of food. It is a most striking fact that the carp, though it does not take any food, during this Winter sleep, yet does not diminish in weight. In the warm climates of Southern Europe, Italy, Spain, Dalmatia, etc., the fish become lively at a much earlier season in the Spring, and Mr. Hessel doubts if, in these climates, it ever goes into a lethargic state, or ceases to feed during the Winter. When the Spring is early, or the water has become warmed by the sun, in central Europe, it is ready to spawn by May, and continues spawning at intervals for a month or two. Days and weeks may pass before it will have left the last egg to the care of nature. In Sicily, and in Algeria, which have climates not dissimilar to the interior of California, it commences to spawn in April. The female carp yields an immense number of eggs. One of five pounds weight has produced half a million. The eggs are adhesive, and are, when extruded, attached to aquatic plants, brush, or stones. The male fish follows the female among the growing water grass and weeds, and impregnates the eggs after they are extruded. If the weather is warm, the young fish are hatched in about two weeks. Cold water delays the hatching of the eggs for about three weeks. Ponds of cold water with a rock bottom are not favorable to the growth of this fish. If the water is warm, and the pond has a muddy bottom, the young fish should, at the close of the third Summer, weigh an average of three pounds. If the pond contain large quantities of food, the fish may weigh as much as five pounds at the close of the third year. This fish is said to live to a great age, and is also said to increase in weight up to about thirty years. Ponds for carp, in California, need not be over three feet in depth.

In stocking ponds, in Europe, it is estimated that there should be

placed in the water three mature females and two males to each acre. The eggs are subject to many casualties; they get smothered, are eaten by other fish, and even by the parents, so that it is not usual to obtain more than eight hundred or one thousand young fish from the vast number of eggs extruded by each female. A larger percentage of young fish would be obtained if the pond contained no fish but carp, and the parents were caught and removed to other waters after the eggs were deposited. The eggs of carp, although adhesive, have been hatched artificially. A more simple plan is to make a rough box-shaped frame of willow sticks, tied or nailed together, four or five feet long, three wide, and one high. This frame should be densely interwoven with the brush of Monterey cypress, or of the redwood, and not to be trimmed on the inside of the frame. Put this in the pond where it can float, and place in it two ripe females and one male; cover the top with netting, so that the fish may not escape. The females will fill the brush on the bottom and sides with eggs, which the male will impregnate. When the spawning is completed, the fish should be removed. In due time the young fish will make their appearance. This is a close imitation of nature, while the eggs are preserved from enemies.

The carp in Europe is considered so valuable a fish, and supplies such a large amount of food, that it is deservedly popular. Wherever it has been introduced in California, it has grown and increased in numbers.

So many persons are desirous of obtaining this fish for ponds, sloughs, and lakes, in their several localities that we have considered it advisable to give this condensed statement as to the best means for the care and increase of this variety of fish.

#### BLACK BASS—MICROPTERUS NIGRICANS.

The seventy-three black bass placed in Napa River in 1873, were probably all caught by anglers before they had time to propagate. We heard that some were caught, during that year, from the river in which they were deposited, but cannot learn that any have been seen since. Twenty-two mature fish were brought from the East in July, 1879, and placed by us in the Crystal Spring Reservoir, of the Spring Valley Water Company, in San Mateo County, with the assurance, on the part of the officers of that company, that the lake would be preserved and no fish allowed to be caught until the Fish Commissioners granted permission; and, with the further promise that, if the fish increased, the State could at all times take them for public distribution. These fish have done well, and are rapidly increasing in numbers. In another year the young can be caught and distributed to appropriate waters.

The Sportsman's Club, of San Francisco, have also imported a number of these fish and placed them in a lake in Alameda. We are pleased to learn that these also have increased in numbers.

#### STRIPED BASS—ROCCUS LINEATUS.

The one hundred and fifty striped bass brought in 1879, and placed in the water in the Straits of Carquinez are probably increasing. One of these fish was caught in the bay near Saucelito, and brought to market and identified. We have heard of a few others having



been captured at Monterey, and near Alameda. This is one of the most valuable ocean and river fish of the Atlantic coast, and supplies a large amount of food to the people of the Eastern States. There is now no doubt they will thrive in our waters, and we shall make every exertion to obtain large numbers, so that, in time, our bays and brackish waters, at the mouth of our rivers, may be fully stocked.

#### LOBSTERS AND EELS.

The twenty-four mature lobsters, to which were attached about two million eggs nearly ready to hatch, brought from the Atlantic in 1879, were placed in a sheltered cove near the Golden Gate. No person, so far as we can learn, has as yet tried to capture any of them, and none have been accidentally caught. As all the conditions seemed favorable, we have no doubt the young are growing, and that, during the coming Summer, we shall hear of California lobsters having been taken and brought to market.

Occasionally we hear of an eel being captured, but as yet they have not showed an increase in proportion to that of other imported fish.

#### EASTERN AND CALIFORNIA TROUT.

We each Winter hatch the eggs of large numbers of both these varieties of trout, and distribute them in streams in different parts of the State. The South Yuba and the North Fork of the American Rivers, which originally contained no fish above the high falls on each stream, are now well stocked with both kinds of trout. We have also stocked other streams, which naturally contained no fish, or from which all the fish had been caught.

#### FISH-WAYS.

Whenever we have learned that the passages for fish are obstructed by artificial dams in any streams, we have notified the owners of such obstructions to remove them, or construct fish-ways, so as to permit the free passage of fish. When the owners neglect or refuse to comply with the law, we place the matter in the hands of the District Attorney of the county for prosecution. The law controlling the subject is deemed wise and beneficial, and only in a few cases has it been found necessary to do more than call the attention of the offending parties to its requirements.

At the last session of the Legislature an Act was passed "To provide for removing obstructions in Pit River, above the mouth of Hat Creek, so as to enable salmon to reach the spawning grounds on the upper waters of said river and its tributaries."

At the place designated on the Pit, there is a fall of forty-one feet. The salmon in vast numbers reach the foot of this fall, and are now unable to pass. If a passage were made over this fall through which the fish could pass, they would find on the upper waters of the Pit and its tributaries, between two and three hundred miles of unobstructed spawning grounds. This would make an area of spawning ground equal to that now used by salmon in all the other tributaries of the Sacramento. Therefore, the removal of this obstruction should, in a few years, even if artificial propagation were discontinued, more than double the present number of salmon annually visiting the

Sacramento River. In addition, a passage for fish over this natural obstruction would give the rapidly increasing population of the northeastern portion of the State an abundance of fish. This Act provides that the Fish Commissioners should advertise for proposals, and let a contract for a fish-way over this fall, and makes an appropriation of three thousand dollars, with which to pay the cost and incidental expenses of this work.

As a preliminary to advertising, we appointed A. W. Von Schmidt, from his known reputation as a civil engineer, to make a survey and sketch of this fall, so that of the various fish-ways in use that best adapted to the situation might be selected. On the approval of his plan, an advertisement was published in different newspapers, as required by law. When the bids were opened, it was found that the lowest was that of Mr. S. C. Mooers, for \$2,100. Contracts, in duplicate, were made out and sent to him for his signature. After some weeks he wrote, stating that he could not do the work for the amount of his bid. We then wrote to E. E. Van Sickel, F. H. Kenyon, and W. H. Kenyon, the only other bidders, who had proposed to do the work for \$2,300, stating the facts as to Mooers' refusal, and asked them if they would contract to do the work, during the coming Summer, for the amount of their bid, \$2,300. They replied that they would, and contracts have been signed by them, dated January 5, 1881. The work is to be completed between August 1, and November 1, 1881.

This Act is peculiarly worded. Section four says: "When the work is completed, approved, and accepted by the Fish Commissioners, they shall certify the amount due upon said contract or contracts, and the amount due for advertising and other necessary expenses incurred by them in carrying out the provisions of this Act to the State Board of Examiners, and when approved by said Board, the amount shall be paid out of the General Fund in the State treasury."

The Controller construes this Act to mean that none of the incidental expenses, such as surveying and advertising, can be paid until the whole work is completed. These necessary expenses, preliminary to letting the contract, amount to about \$250, and, as the persons who have performed the work should be paid for their services, we have to request that a supplemental Act should be passed, allowing the Board of Examiners to audit these accounts, and the Controller to draw his warrant on the appropriation made for this purpose.

#### BAY AND COAST FISH.

Accompanying this will be found a report from Mr. W. N. Lockington giving a general and popular description of the most important of the fishes hitherto discovered in the inland and coast waters of the Pacific Coast, U. S. A. In this work he has had the benefit of the notes and discoveries of Professors Jordan and Gilbert, who, as the representatives of the Smithsonian Institute and the United States Census Bureau, have been engaged on this coast, during the past summer, in studying its fish fauna. Many of these fishes are known only by descriptions lately published in the Proc. U. S. Nat. Museum. Mr. Lockington's statements of the habits and migrations, as well as of the places, upon our coast, where particular varieties of food fish are most abundant, if studied by-

our fishermen, would be of service in promoting their industry. His statistics and investigations in connection with the rapidly increasing codfish business of this coast have much interest in showing that the codfish banks are probably as extensive and inexhaustible as those of Newfoundland. As population increases on the Pacific Coast and new markets are found for the cured fish, this industry will be found capable of great enlargement, and thus promote varied industries and furnish employment to a large number of men and boys.

#### APPROPRIATION AND EXPENDITURES.

There is herewith appended a detailed account of the appropriation received and expenditures incurred since our last report. We have sought to exercise the greatest economy consistent with the work to be performed. With the experience we have obtained during ten years, it is believed that no money has been expended in doubtful experiments. We now know that the money of the people appropriated for fish culture is resulting in the production of a large increase of valuable and nutritious food, which is sold to the consumers at low prices. We also know that fish culture, by the State, is adding to the industries of the people and increasing the public wealth.

It is with gratification we add that our work seems to be appreciated by the public as one of increasing importance. We are looking for the time when the public will also appreciate the necessity of sustaining the officers of the law in performing their duties in restraining illegal fishing.

# REPORT

UPON THE

## EDIBLE FISHES OF THE PACIFIC COAST, U. S. A.

BY W. N. LOCKINGTON.

Since the publication of the last report of the Fish Commissioners of this State, more than forty new species have been described, the greater part of them by Professor D. S. Jordan and his assistant, Mr. Gilbert, both of the United States Fish Commission. Beside these hitherto unknown forms, our fauna has been enriched by the discovery of the occurrence upon our coast of numerous previously known species of pelagic habits, most of them either belonging to the Elasmobranchii (sharks and rays), or to the mackerel and allied families.

These discoveries, notwithstanding the elimination of several nominal species, raise the total number of California fishes to two hundred and seventy-eight.

If to this number are added thirty-four species occurring in Oregon and Washington Territory, and not yet recorded from our State, we arrive at a grand total of three hundred and twelve species belonging to the Pacific Coast of the United States.

This number includes the native species only; but the following introduced species are of more or less frequent occurrence in our markets, and must be considered as forming part of our supply of food fishes: Striped Bass, *Morone saxatilis*; Shad, *Alosa sapidissima*; Common Carp, *Carassius vulgaris*; Catfish (two species), *Ameiurus catus*, *Ameiurus albidus*.

Several other Eastern species have been introduced, but have not yet become of common occurrence.

For the greater portion of the facts brought together in the following pages, I have to thank Professor D. S. Jordan, who kindly placed his notes at my disposal, and assisted me in many other ways, and his indefatigable assistant, Mr. C. Gilbert. These gentlemen have made a more thorough investigation of the fish fauna of our coast than has ever been made before, so that the present year has been more fruitful in facts of scientific and economic interest than any preceding one since the date of publication of the explorations and surveys for a railroad route from the Mississippi to the Pacific.

My own observations have necessarily been for the most part confined to the neighborhood of San Francisco; the supply brought to the markets of this city; and the specimens in various collections, especially that of the California Academy of Sciences.

## LIST OF THE FISHES OF THE STATE OF CALIFORNIA.

## ABBREVIATIONS USED.

F. W. .... Fresh water.	Blank. .... Entire coast.
C. S. .... Point Concepcion, southward.	F. .... Monterey and San Francisco.
C. N. .... Point Concepcion, northward.	F. S. .... San Francisco, southward.
E. S. .... Entire coast, commonest south.	F. N. .... San Francisco, northward.
E. N. .... Entire coast, commonest north.	S. D. .... San Diego, southward.
P. S. .... Puget Sound.	B. N. .... Santa Barbara, northward.

## ORIGINAL DESCRIBERS.

Gir. .... Girard.	Pal. .... Pallas.
J. & G. .... Jordan and Gilbert.	Cuv. .... Cuvier.
Ay. .... Ayres.	Val. .... Valenciennes.
Ln. .... Lockington.	L. .... Linneus.
Cr. .... Cooper.	Ag. .... Agassiz.
Str. .... Steindachner.	Rich. .... Richardson.
Gnth. .... Günther.	Raf. .... Rafinesque.
B. & G. .... Baird and Girard.	Walb. .... Walbaum.

Other names are written in full.

## PLECTOGNATHI.

Orthogoriscidæ—	F. S.
Mola rotunda, Cuv. ....	S. D.
Diodon maculatus, Lac. ....	
Tetrodontidæ—	S. D.
Tetrodon politus, Gir. ....	

## LOPHOBRANCHII.

Syngnathidæ—	C. S.
Syngnathus punctipinnis, Gill. ....	B. N.
Syngnathus californiensis, Storer. ....	C. S.
Syngnathus dimidiatus, Gill. ....	S. D.
Syngnathus leptorhynchus, Gir. ....	
Hippocampidæ—	S. D.
Hippocampus ingens, Gir. ....	

## HEMIBRANCHII.

Gasterosteidæ—	F. N.
Gasterosteus aculeatus var. serratus, Ay. ....	
Gasterosteus microcephalus, Gir. ....	F. W.
Eucalia williamsoni, Gir. ....	
Aulorhynchidæ—	C. N.
Aulorhynchus flavidus, Gill. ....	

## HETEROSOMATA.

Pleuronectidæ—	F. N.
Hippoglossus vulgaris, Fleming. ....	C. N.
Hippoglossoides jordani, Ln. ....	C. N.
Hippoglossoides exilis, J. & G. ....	F.
Atheresthes stomias, J. & G. ....	C. N.
Psettichthys melanostictus, Gir. ....	F. S.
Paralichthys maculosus, Gir. ....	C. S.
Xystreurus liolepis, J. & G. ....	
Citharichthys sordidus, Gir. ....	F.
Glyptocephalus zachirus, Ln. ....	C. N.
Cynicoglossus pacificus, Ln. ....	C. N.
Pleuronectes stellatus, Pal. ....	F.
Pleuronichthys decurrens, J. & G. ....	E. N.
Pleuronichthys coenosus, Gir. ....	F.
Pleuronichthys verticalis, J. & G. ....	F. S.
Hypsopsetta guttulata, Gir. ....	B. N.
Parophrys vetulus, Gir. ....	F. N.
Parophrys isolepis, Ln. ....	C. N.
Lepidopsetta bilineata, Ay. ....	S. D.
Aphoristia atricauda, J. & G. ....	

## ANACANTHINI.

## Gadidae—

<i>Microgadus proximus</i> , Gir.	C. N.
<i>Pollachius chalcogrammus</i> , Pal.	C. N.
<i>Merluccius productus</i> , Ay.	B. N.
<i>Brosomphycis marginatus</i> , Ay.	F.

## Ophidiidae—

<i>Ophidium taylori</i> , Gir.	B. N.
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## Zoarcidae—

<i>Lycodopsis paucidens</i> , Ln.	F.
<i>Lycodopsis pacificus</i> , Collett.	F. N.

## ACANTHOPTERI.

## Blennidae—

<i>Cebedichthys violaceus</i> , Gir.	C. N.
<i>Anarrhichthys ocellatus</i> , Gir.	C. N.
<i>Anoplarchus atropurpureus</i> , Kittlitz	C. N.
<i>Muraenoides nebulosus</i> , Schlegel	C. N.
<i>Muraenoides letus</i> , Cope	C. N.
<i>Apodichthys flavidus</i> , Gir.	C. N.
<i>Apodichthys fucorum</i> , J. & G.	C. N.
<i>Xiphister mucosus</i> , Gir.	C. N.
<i>Xiphister chirus</i> , J. & G.	C. N.
<i>Xiphister rupestris</i> , J. & G.	C. N.
<i>Lumpenus anguillaris</i> , Pal.	F. N.
<i>Creminobates monophthalmus</i> , Gnthr.= <i>integripinnis</i> , Ros. Smith	S. D.
<i>Gibbonsia elegans</i> , Cr.	F. S.
<i>Heterostichus rostratus</i> , Gir.	F. S.
<i>Neoclinus satiricus</i> , Gir.	F. S.
<i>Neoclinus blanchardi</i> , Gir.	F. S.
<i>Hypleurochilus gentilis</i> , Gir.	C. S.

## Batrachidae—

<i>Porichthys porosissimus</i> , Cuv. & Val.	
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## Trachinidae—

<i>Icosteus enigmaticus</i> , Ln.	F. N.
<i>Ichthys lockingtoni</i> , J. & G.	F.
<i>Caulolatilus anomalus</i> , Cr. (=princeps?)	F. S.
<i>Trichodon stelleri</i>	F. N.

## Trachypteridae—

<i>Trachypterus altivelis</i> ? Kner.	F. N.
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## Liparididae—

<i>Liparis pulchellus</i> , Ay.	C. N.
<i>Neoliparis mucosus</i> , Ay.	C. N.

## Gobiesocidae—

<i>Gobiesox reticulatus</i> , Gir.	C. N.
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## Gobiidae—

<i>Gillichthys mirabilis</i> , Cr.	M. S. (and N.?)
<i>Lepidogobius gracilis</i> = <i>Gobius lepidus</i> , Gir.	F. N.
<i>Lepidogobius newberryi</i> , Gir.	?
<i>Crystallogobius eos</i> , Rosa Smith	S. D.

## Agonidae—

<i>Podothecus vulsus</i> , J. & G.	F.
<i>Podothecus trispinosus</i> , Ln.	E. S.
<i>Brachyopsis verrucosus</i> , Ln.	F.
<i>Brachyopsis xyosternus</i> , J. & G.	F.

## Triglidæ—

<i>Prionotus stephanophrys</i> , Ln.	F.
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## Cottidae—

<i>Artedius pugettensis</i> , Str.	F. N.
<i>Artedius quadriseriatus</i> , Ln.	F.
<i>Artedius lateralis</i> , Gir.	F. N.
<i>Artedius notospilotus</i> , Gir.	B. N.
<i>Hemilepidotus spinosus</i>	F.
<i>Hemilepidotus gibbsii</i> , Gill	F. N.
<i>Leptocottus armatus</i> , Gir.	
<i>Aspicottus bison</i> , Gir.	F. N.
<i>Liocottus hirundo</i> , Gir.	C. S.

<i>Oligocottus globiceps</i> , Gir.	C. N.
<i>Oligocottus maculosus</i> , Gir.	C. N.
<i>Oligocottus analis</i> , Gir.	F. S.
<i>Scorpenichthys marmoratus</i> , Hy.	
<i>Uranidea gulosus</i> , Gir.	F. W.
<i>Uranidea asper</i> (Rich) Gir.	F. W.
<i>Ascelichthys rhodorus</i> , J. & G.	F. N.
<i>Blepsias cirrhosus</i> , Pal.	F. N.
<i>Nautichthys oculo-fasciatus</i> , Gir.	F. N.
<b>Chiridæ—</b>	
<i>Zaniolepis latipinnis</i> , Gir.	F. N.
<i>Oxylebius pictus</i> , Gill.	F. N.
<i>Myriolepis zonifer</i> , Ln.	F.
<i>Chirus decagrammus</i> , Pal.	C. N.
<i>Chirus pictus</i> , Ay.	F. N.
<i>Ophiodon elongatus</i> , Gir.	C. N.
<i>Anoplopoma fimbria</i> , Pal.	F. N.
<b>Scorpenidæ—</b>	
<i>Scorpena guttata</i> , Gir.	C. S.
<i>Sebastichthys nigrocinctus</i> , Ay.	F. N.
<i>Sebastichthys sericeus</i> , J. & G.	F. S.
<i>Sebastichthys chrysomelas</i> , J. & G.= <i>fasciatus</i> , Gir.	F. S.
<i>Sebastichthys nebulosus</i> , Ay.	F. N.
<i>Sebastichthys carnatus</i> , J. & G.	F. S.
<i>Sebastichthys maliger</i> , J. & G.	F. N.
<i>Sebastichthys caurinus</i> , Rich. Var. <i>vexillaris</i> , J. & G.	E. N.
<i>Sebastichthys rastrelliger</i> , J. & G.	F. S.
<i>Sebastichthys auriculatus</i> , Gir.	B. N.
<i>Sebastichthys rubrivinctus</i> , J. & G.	B. N.
<i>Sebastichthys ruber</i> , Ay.	B. N.
<i>Sebastichthys constellatus</i> , J. & G.	B. N.
<i>Sebastichthys rosaceus</i> , Gir.	B. N.
<i>Sebastichthys rhodochloris</i> , J. & G.	F.
<i>Sebastichthys chlorostictus</i> , J. & G.	F.
<i>Sebastichthys miniatus</i> , J. & G.	F. S.
<i>Sebastichthys pinniger</i> , Gill.	F. N.
<i>Sebastichthys atrovirens</i> , J. & G.	F. S.
<i>Sebastichthys elongatus</i> , Ay.	F.
<i>Sebastichthys proriger</i> , J. & G.	F.
<i>Sebastichthys ovalis</i> , Ay.	F. S.
<i>Sebastichthys entomelas</i> , J. & G.	F.
<i>Sebastichthys mystinus</i> , J. & G.= <i>Sebastodes melanops</i> , Ay.	
<i>Sebastichthys ciliatus</i> , Tilesius= <i>melanops</i> , Grd.= <i>simulans</i> , Gill.	F. N.
<i>Sebastichthys flavidus</i> , Ay.	F. S.
<i>Sebastodes paucispinis</i> , Ay.	F. S.
<b>Stromateidæ—</b>	
<i>Stromateus simillimus</i> , Ay.	
<b>Carangidæ—</b>	
<i>Caranx caballus</i> , Gnthr.	C. S.
<i>Trachurus saurus</i> , Raf.	F. S.
<i>Seriola lalandi</i> , Cuv. & Val.	C. S.
<b>Echeneididæ—</b>	
<i>Remora jacobæa</i> , Lowe.	F.
<i>Echeneis naucrates</i> , L.	F.
<b>Xiphiidæ—</b>	
<i>Xiphias gladius</i> , L.	C. S.
<b>Scombridæ—</b>	
<i>Scomber pneumatophorus</i> , De la Roché	F. S.
<i>Scomber scombrus</i> , L.	Straying to Santa Catalina Id.
<i>Scomberomorus concolor</i> , Ln.	F.
<i>Sarda chilensis</i> , Cuv. & Val.= <i>Pelamys lineolata</i> , Grd.	F. S.
<i>Oreynus alalonga</i> , Gmelin	F. S.
<i>Oreynus pelamys</i> ? (sp. not seen.) Ln.	C. S.
<b>Coryphænidæ—</b>	
<i>Coryphæna hippurus</i> ? L.	Cayucos.
<b>Pomacentridæ—</b>	
<i>Hypsipops rubicundus</i> , Gir.	C. S.
<i>Chromis punctipinnis</i> , Cr.	C. S.
<i>Chromis atrilobata</i> , Gill	C. S.

## Labridæ—

<i>PlatyGLOSSUS semicinctus</i> , Ay.	C. S.
<i>Pseudojulis modestus</i> , Gir.	F. S.
<i>Pinnelometopon putcher</i> , Ay.	F. S.

## Embiotocidæ—

<i>Hypsurus caryi</i> , Ag.	F. S.
<i>Ditrema jacksoni</i> , Gir.	
<i>Ditrema laterale</i> , Ag.	B. N.
<i>Ditrema atripes</i> , J. & G.	F.
<i>Ditrema furcatum</i> , Gir.	F. S.
<i>Danallchthys argyrosomus</i> = <i>vacca</i> , Gir.	E. N.
<i>Amphistichus argenteus</i> , Ag.	F. S.
<i>Rhacochilus toxotes</i> , Ag.	F. S.
<i>Holconotus rhodoterus</i> , Ag.	F. S.
<i>Holconotus argenteus</i> , Gibbons.	F. S.
<i>Holconotus agassizii</i> , Gill.	B. N.
<i>Holconotus analis</i> , A. Ag.	C. N.
<i>Cymatogaster aggregatus</i> , Gibbons.	E. N.
<i>Brachyistius frenatus</i> , Gill.	
<i>Brachyistius rosaceus</i> , J. & G.	F.
<i>Abeona minima</i> , Gibbons.	F. S.
<i>Abeona aurora</i> , J. & G.	F.
<i>Hysteroecarpus traskii</i> , Gibbons.	F. W.

## Sciaenidæ—

<i>Corvina saturna</i> , Gir.	C. S.
<i>Roncador stearnsii</i> , Str.	C. S.
<i>Genyonemus lineatus</i> , Ay.	F. S.
<i>Umbrina xanti</i> , Gill.	C. S.
<i>Cynoscion parvipinnis</i> , Ay.	C. S.
<i>Cynoscion nobilis</i> , Ay.	F. S.
<i>Seriplus politus</i> , Gir.	F. S.
<i>Menticirrhus undulatus</i> , Gir.	C. S.

## Ephippidæ—

<i>Parephippus faber</i> , Bloch= <i>Ephippus zonatus</i> , Gir.	F. S.
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## Separiidæ—

<i>Girella nigricans</i> , Ay.	F. S.
<i>Scorpiis californiensis</i> .	F. S.

## Percidæ—

<i>Xeichthys californiensis</i> , Str.	S. D.
<i>Pristipoma davidsoni</i> , Str.	C. S.
<i>Stereolepis gigas</i> , Ay.	F. S.
<i>Serranus clathratus</i> , Gir.	F. S.
<i>Serranus nebulifer</i> , Gir.	F. S.
<i>Serranus maculofasciatus</i> , Str.	C. S.
<i>Archoplites interruptus</i> , Gir.	F. W.

## Ammodytidæ—

<i>Ammodytes personatus</i> , Gir.	F. N.
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## Sphyrenidæ—

<i>Sphyrena argentea</i> , Gir.	F. S.
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## PERGESOCES.

## Atherinidæ—

<i>Atherinopsis californiensis</i> , Gir.	F. S.
<i>Atherinops affinis</i> , Ay.	C. S.
<i>Leuresthes tenuis</i> , Ay.	S. D.

## Mugilidæ—

<i>Mugil mexicanus</i> , Str.	F. S.
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## SYNENTOGNATHI.

## Scomberesocidæ—

<i>Scomberesox brevirostris</i> , Peters.	F. S.
<i>Tylosurus exilis</i> , Gir.	C. S.
<i>Hemiramphus rose</i> , J. & G.	C. S.
<i>Exocoetus californiensis</i> , Cr.	C. S.

## HAPLOMI.

## Cyprinodontidæ—

<i>Fundulus parvipinnis</i> , Gir.	C. S.
<i>Cyprinodon californiensis</i> , Gir.	S. D.



## ISOSPONDYLI.

Synodontidæ—	F. S.
Synodus lucioceps, Ay.-----	
Paralepidæ—	C. S.
Sudis ringens, J & G.-----	
Scopelidæ—	C. S.
Myctophum crenulare, J. & G.-----	
Alepidosauridæ—	F. N.
Alepidosaurus borealis, Gill-----	
Salmonidæ—	C. N.
Osmerus thaleichthys, Ay.-----	
Osmerus attenuatus, Ln.-----	F.
Hypomesus olidus, Pal.-----	F. N.
Oncorhynchus keta, Walb.=tsuppitch, Rich.-----	Sac. Riv. N.
Oncorhynchus gorboscha, Walb.-----	Sac. Riv. N.
Oncorhynchus quinnat, Rich.-----	Ventura Riv. N.
Oncorhynchus kisutch, Walb.=canis, Suckley-----	Sac. Riv.
Salar mykiss, Walb.-----	Riv. of Mont. Bay, N.
Salar irideus, Gibbons-----	F. W.
Salar henshawii, Gill & Jor.-----	Lake Tahoe, etc.
Salar clarki, Rich.-----	Riv. of Mont. Bay, N.
Salvelinus malma, Walb.=spectabilis, Gir.-----	F. W.
Coregonus williamsoni, Gir.-----	Lake Tahoe.
Clupeidæ—	F. S.
Albula vulpes, L.-----	E. N.
Clupea mirabilis, Gir.-----	F. S.
Clupea sagax, Jenyns-----	E. S.
Stolephorus ringens, Jenyns-----	C. S.
Stolephorus compressus, Gir.-----	S. D.
Stolephorus delicatissimus, Gir.-----	

## EVENTOGNATHI.

Catostomidæ—	F. W.
Catostomus occidentalis, Gir.-----	F. W.
Catostomus labiatus, Ay.-----	F. W.
Catostomus tahoensis, J.-----	
Cyprinidæ—	F. W.
Orthodon microlepidotus, Ay.-----	F. W.
Gila conformis, B. & G.-----	F. W.
Gila grandis, Ay.-----	F. W.
Gila rapax, Gir.-----	F. W.
Siboma crassicauda, Gir.-----	F. W.
Myloleucus bicolor, Gir.-----	Klamath Lake.
Myloleucus formosus, Gir.-----	F. W.
Cheonda crassa, Gir.-----	F. W.
Lavinia exilicanda, B. & G.-----	F. W.
Lavinia harengus, Grd.-----	F. W.
Lavinia gibbosa, Ay.-----	F. W.
Notemigonus occidentalis, B. & G.-----	F. W.
Pogonichthys inæquilobus, B. & G.-----	F. W.
Pogonichthys symmetricus, B. & G.-----	F. W.
Pogonichthys argyriosus, B. & G.-----	F. W.
Mylopharodon conocephalus, Ay.-----	F. W.

## APODES.

Muraenidæ—	C. S.
Muraena mordax, Ay.-----	Humboldt Bay.
Myrichthys tigrinus, Gir.-----	
Ophisuridæ—	C. S.
Ophichthys triserialis, Kaup.-----	

## CHONDROSTEI.

Acipenseridæ—	F. N.
Acipenser transmontanus, Rich.-----	F. N.
Acipenser medirostris, Ay.=A. acutirostris, Gnthr.-----	

## CLASS ELASMOBRANCHII.

## HOLOCEPHALI.

Chimæridæ—	
Chimæra collei, Bennett.....	C. N.

## PLAGIOSTOMI.

Dasybatidæ—	
Urolophus halleri, Cr.....	C. S.
Pteroplatea marmorata, Cr.....	C. S.
Dasybatis dipterurus, J. & G.....	S. D.

Myliobatidæ—	
Myliobatis californicus, Gill.....	F. S.
Ætobatis laticeps, Gill.....	?

Cephalopteridæ—	
Manta birostris, Walb.....	S. D.

Raiidæ—	
Raia cooperi, Gir.....	C. N.
Raia binoculata, Ay.....	F.
Raia rhina, J. & G.....	C. N.
Raia stellulata, J. & G.....	F.
Zapteryx exasperatus, J. & G.....	S. D.

Rhinobatidæ—	
Rhinobatus productus, Ay.....	F. S.
Rhinobatus triseriatus, J. & G.....	F. S.

Torpedinidæ—	
Torpedo californica, Ay.....	F.

## SYUALI.

Squatidæ—	
Squatina angelus, Dumeril.....	F. S.

Heterodontidæ—	
Heterodontus francisi, Gir.....	C. S.

Hexanchidæ—	
Notorhynchus maculatus, Ay.....	F. N.
Hexanchus corinus, J. & G.....	F. N.

Alopiidæ—	
Alopias vulpes, Gmelin.....	F.

Scylliidæ—	
Catulus ventricosus, Garman.....	F. S.

Lamnidæ—	
Isurus oxyrinchus, Raf.....	C. S.
Carcharodon carcharias, L.=rondeletii, Muller & Henle.....	F. S.
Lamna cornubica, Gmelin.....	

Cetorhinidæ—	
Cetorhinus maximus, L.....	F.

Galeorhinidæ—	
Galeorhinus galeus, L.....	F. S.
Galeocerdo tigrinus, Muller & Henle.....	S. D.
Carcharinus glaucus, L.....	F. N.
Eulamia lamia, Risso.....	S. D.
Triakis semifasciatus, Gir.....	
Rhinotriakis henlei, Gill.....	F.
Mustelus hinulius, Blainville.....	F. S.

Sphyrnidæ—	
Sphyrna zygaena, L.....	S. D.

Spinacidæ—	
Squalus acanthias, L.....	C. N.

## MARSIPOBRANCHII.

Petromyzontidæ—	
Entosphenus tridentatus, Rich.....	F. N.
Ammocætes plumbeus, Ay.....	F. N.

Myxinidæ—	
Polistotrema dombeyi, Muller=Bdellostoma stouti, Ln.....	F. N.

## CIRROSTOMI.

Branchiostomatidæ—	
Branchiostoma lanceolatum .....	S. D.

## FISHES OF OREGON AND WASHINGTON TERRITORY,

NOT YET ON RECORD, FROM THE COAST OF CALIFORNIA.

Heterosomata—	P. S.
Hippoglossoides elassodon, J. & G. ....	P. S.
Parophrys ischyryus, J. & G. ....	P. S.
Anacanthini—	P. S.
Gadus morrhud, Tilesius .....	P. S.
Seytalina cerdale, J. & G. ....	P. S.
Trachinidæ—	P. S.
Bathymaster signatus, Cope .....	P. S.
Gobiidæ—	?
Liparis cyclopus, Gnthr .....	?
Discoboli—	Vancouver Id.
Eumicotrems orbis, Gill .....	Vancouver Id.
Agonidæ—	
Aspidophoroides inermis, Gnthr. ....	
Podothecus acipenserinus, Pal. ....	Puget Sd. N.
Bothragonus swani, Str. ....	?
Cottidæ—	
Psychrolutes paradoxus, Gnthr. ....	Puget Sd.
Cottus polyacanthocephalus, Pal. ....	Puget Sd.
Chiridæ—	Puget Sd. N.
Chirus stelleri, Tilesius .....	Puget Sd. N.
Chirus nebulosus, Gir. ....	?
Scorpenidæ—	P. S.
Sebastichthys caurinus, Rich. ....	P. S.
Paralepidæ—	P. S.
Paralepis coruscans, J. & G. ....	P. S.
Scopelidæ—	?
Myctophum procellarum, Bean .....	?
Salmonidæ—	
Thaleichthys pacificus .....	Columbia R. and P. S.
Oncorhynchus nerka, Walb. ....	Columbia R. and P. S.
Oncorhynchus kennerlyi, Suckley .....	Columbia R. and P. S.
Muraenidæ—	P. S.
Nemichthys avocetta, J. & G. ....	P. S.
Scymnidæ—	P. S.
Somniosus microcephalus, Bloch .....	P. S.

## EVENTOGNATHI.

Catostomidæ—	
Catostomus longirostris, Le Sueur .....	F. W.
Catostomus macrochilus, Gir. ....	F. W.
Lypomyzon luxatus, Cope .....	F. W.
Lypomyzon brevirostris, Cope .....	F. W.

## CYPRINIDÆ.

Gila bicolor, Grd. ....	Klamath Lake, Or.
Gila oregonensis, Rich. ....	F. W.
Cheonda cooperi, Gir. ....	F. W.
Cheonda cœrulea, Gir. ....	F. W.
Richardsonius balteatus, Rich. ....	F. W.
Richardsonius lateralis, Gir. ....	F. W.
Apocope nubilus, Gir. ....	F. W.
Mylocheilus caurinus, Rich. ....	F. W.

The fishes, the names of which are printed in italics, are not included in the published list by Messrs. Jordan and Gilbert in the Proc. U. S. Nat. Mus., because not seen by them, yet by reliable report occur in our waters. It is probable that several additional species of pelagic fishes, especially those of the mackerel and allied families, will be found to occur at San Diego, the marine fauna of which place is largely that of Lower California.

The ranges given for the species must not be regarded as final, but simply as the range now on record. As there is no fishery of any importance between Tomales Bay and the mouth of the Columbia, it is probable that several species now believed to be extra-Californian occur in the northern part of our State, and that many not on record north of San Francisco extend much farther northward.

#### HETEROSOMATA—FLATFISHES.

Much additional information respecting the flatfishes of the Pacific Coast has been gathered together since the date of the last report. The thirteen species there enumerated have, by the researches of Professor D. S. Jordan, been increased to twenty-one, seventeen of which are known to occur, more or less frequently, in the markets of San Francisco, and nineteen on the coast of California. Three species of the genus *Hippoglossoides* are now known, as well as three of *Pleuronichthys*, and the species of *Parophrys* are increased from one to three, but all the other species are the sole representatives of their genera upon this coast.

It is the custom of the dealers to lump together all the flatfishes, except the two kinds called halibut, that known as "turbot," and *Pleuronectes stellatus*, commonly called the flounder, and to sell them all at the same price. Yet it is tolerably well known that the Turbot (*Hypsopsetta guttulata*), the Black-dotted Sole (*Psettichthys melanoctictus*), and the Long-finned Flounder (*Glyptocephalus zachirus*) are superior to the others for the table.

*Hippoglossus vulgaris*, Halibut—The halibut of this coast is now known to be identical with that of the Atlantic. The Farallone Islands and Monterey appear to be the most southern point at which this fish is found, but it becomes abundant off Cape Mendocino and Humboldt Bay, and more so northward of California. It is essentially a northern species, and in Europe occurs around the coasts of England and Ireland, but becomes more abundant at the Orkneys, and is common on the coasts of Norway and Iceland. On the Atlantic coast its southern limit appears to be Massachusetts Bay. It will be seen that on the Pacific Coast its range extends further southward than in the Atlantic, a fact probably accounted for by the equable temperature of the ocean along the coast from San Francisco to the Columbia. The mean Summer temperature of the ocean at the Golden Gate is 58° Far., while at the mouth of the Columbia it is 60°, or slightly higher. In the Winter it is 53° off the Golden Gate, and 50° off the mouth of the Columbia. Thus it is evident that the temperature off the Golden Gate cannot be very unsuitable to fish that are at home off the mouth of the Columbia. The halibut is a deep water fish, and does not enter land-locked bays like those of Humboldt or Tomales.

When the large and abundant supply of this fish is considered, it is a matter of wonder that so small a quantity is smoked or canned for market. There is a prejudice in favor of Eastern halibut, which,

doubtless to some extent, hinders the development of this branch of business. The North Pacific Canning Company can some halibut at Klawack, Prince of Wales Island, and it is said to be of good quality.

The endeavor to bring fresh halibut to San Francisco from Puget Sound does not appear to have been financially successful. A schooner load suddenly brought into a market already fully stocked with fish caused the price to fall to about ten cents per pound, and much of it could not be disposed of at that price.

Professor Jordan mentions a large halibut bank near Cape Flattery, and states that considerable numbers are taken with hook and line in the deeper channels of Puget Sound, north of which point it comes more abundant. It feeds upon large fishes, such as codfish.

*Hippoglossoides jordani*, Large-eyed Flounder—It appears strange that this common species should have escaped the notice of naturalists until last year. In the markets of San Francisco it abounds throughout every month of the year, and in Monterey Bay is the most abundant of its tribe. Professor Jordan informs me that about 500 pounds weight of this fish are taken daily at Monterey alone by the Chinese, besides large quantities taken by the Italians. An examination of the stock in trade of the Chinese located near Monterey, proved that over nineteen-twentieths of the fish that dry on hurdles and flap in the wind around the hovels consisted of this fish; a few sharks, with *Psettichthys melanostictus* and *Citharichthys sordidus* constituting the remainder.

It occasionally reaches sixteen inches or more in length, and a weight of five pounds, and is considered one of the best of its tribe, but is inferior to the black-dotted flounder, the turbot, and one or two others. It becomes rare northward, yet occurs in Puget Sound; south of Monterey it is not on record.

*Hippoglossoides exilis*, Large-scaled Flounder—This species is readily distinguished from the preceding by its much more slender form, and by the large size of the scales, which are very delicately ciliate on their hinder edge. The eyes are very large, their longitudinal diameter contained about  $3\frac{1}{2}$  times in the length of the head. The greatest depth is contained about  $3\frac{1}{2}$  times in the total length.

In July it was tolerably common in the markets of San Francisco, and its previous rarity is probably occasioned by the fact that it is only taken in tolerably deep water, and is too small to be considered of much value.

The specimens I have seen were from eight to ten inches in length, and three quarters of a pound in weight. It occurs in Puget Sound, but is not very common.

*Hippoglossoides classodon*—Unlike the two preceding species, this has only a single row of small teeth in the upper jaw. The scales are small, so that it can readily be distinguished from *H. exilis*, while from *H. jordani* it differs externally in the more strongly ciliated scales, and slightly more anterior origin of the dorsal fin.

The example in Mus. Cal. Ac. Sci. was taken by Professor Jordan at Seattle, at which port and at Tacoma he reports it as tolerably abundant. It reaches a length of one foot, and a weight of about two pounds.

*Atheresthes stomias*, the Hook-toothed Flounder—Isolated examples of this species, of fifteen to eighteen inches in length, have several times occurred in the markets of San Francisco during this year, but do not appear to have been noticed previously.

In form it is extremely slender, the greatest width scarcely extending one fourth of the total length, and tapering rapidly toward both extremities. The head enters about four and a half times in the total length, and is narrow, with an immense mouth, the upper jaw of which exceeds in length the one half of that of the head. The eyes are almost even in front, the upper one placed almost across the top of the head, and looking toward the dorsal outline. The teeth are numerous, in a double row in both jaws, irregular in size, hooked incurved canines interspersed among smaller upright teeth. The scales are large and soft, resembling in their character those of *Citharichthys sordidus*, and the color is a dirty yellow.

Very few examples have yet been found in our markets, and most of these have been secured for scientific purposes.

The range of this species is not ascertained.

*Glyptocephalus zachirus*, Long-finned Flounder—Up to the present time this species is only known from the markets of San Francisco, to which it is brought from deep water near Point Reyes, some thirty miles north of the city. It is comparatively rare, seldom more than three or four are offered for sale on any one day, and it is not brought in at all in the winter. It attains a length of eighteen inches, and a weight of about two pounds, and is held in high esteem. Hitherto it is only known to occur in Monterey Bay and in the vicinity of San Francisco. As its mouth is too small for the hook, and its habitat too deep for the gill-nets, it is taken chiefly in sweep-nets.

*Cymnoglossus pacificus*, Short-finned Flounder—This is the *Glyptocephalus pacificus* of the report of the Fish Commissioners for 1879. It is usually brought to market from the same place as the preceding species, but is known to occur at other points from Monterey to Puget Sound. It occurs in the market much more abundantly than the last species, yet the adults cannot be said to be common. In size and flavor it does not equal *G. zachirus*. When fresh it is excessively slimy to the touch.

*Pleuronichthys decurrens*, Bastard Turbot—The species described by me as *P. coenosus* Girard (Proc. U. S. Nat. Mus. 97, 1879) was there surmised to be the *Pleuronectes quadrituberculatus* of the old Russian naturalist Pallas. It differs from Girard's *coenosus* in the presence of tubercles upon the side of the head on the colored side. It is now known not to be Pallas' species, and has been named *decurrens* by Jordan and Gilbert.

This fish is now of more frequent occurrence in our markets than formerly, and becomes more abundant towards the south. It reaches about a foot in length, and a weight of from two to three pounds.

*Pleuronichthys verticalis*, Spine-cheeked Turbot—This form was first noticed as a separate species by Professor Jordan, and was described by him from specimens found in San Francisco market. In 1879 I obtained a small example of this fish, but did not venture to describe it as distinct, although some of its peculiarities are noted in my review of the *Pleuronectidæ* (Proc. U. S. Nat. Mus. 1879, 99).

The dorsal fin is not carried downwards on the blind side of the head so far as in the previous species; the cheek is without spines, the posterior extremity of the interorbital ridge is developed into a backward directed spine, and the anterior into two shorter upright spines. This species has occurred in our markets during the present year with tolerable regularity. In Monterey Bay it is of common

occurrence, and attains a length and weight equal to the preceding.

*Pleuronichthys coenosus*—The *P. coenosus* of Girard proves to be a distinct species, and not, as surmised in my review of the *Pleuronectidae* (Pro. U. S. Nat. Mus. 1879, 99) identical with the one known as *decurrens*. In this form there are no tubercles on the cheeks, and the dorsal fin is like that of *verticalis*, but the tubercles between the eyes are not developed into spines and the body is unspotted.

This fish is not often brought to the market of San Francisco, but occurs along the entire coast from Puget Sound to San Diego.

All the species of *Pleuronichthys* feed largely on algæ, with which their stomachs are found to be filled. In this particular they differ from the carnivorous habits of the other flounders. They all occur in deep water, and their increasing abundance in our markets shows that the depauperization of our bays and shallows is constantly forcing our fishermen into the depths.

*Parophrys (Isopsetta) ischyrys*—This is a coarse rough fish, in its general appearance greatly resembling the "Flounder," (*Pleuronectes stellatus*) but differing from it in the ctenoid scales, and in the presence of an accessory lateral line, characters in which it agrees with the next species. It has hitherto been found only in Puget Sound, and reaches a length of about eighteen inches.

*Parophrys (Isopsetta) isolepis*, Rough Even-scaled Flounder—I established the genus *Isopsetta* to contain this species and the preceding, both of which have the characters of a nearly straight lateral line, and strongly ctenoid scales of equal development on head and body, but Prof. Jordan includes them in the same genus with the following species:

The examples brought to San Francisco market are usually small, but Professor Jordan informs me that it attains a length of fifteen inches, and a weight of three pounds. Its range extends to Puget Sound. Its occurrence in our markets is irregular, but occasionally it is abundant, being taken with sweep-nets off Point Reyes.

*Parophrys vetulus*—This species is abundant from San Francisco northward, becoming at Puget Sound the commonest of the flat fishes.

It has been taken by Professor Jordan at Santa Barbara, but appears to become rare south of Point Concepcion. Those brought to market are usually quite small, but occasional examples reach a length of fifteen inches, and a weight of two pounds, or more.

*Lepidopsetta bilineata*, Mottled Sole—The *Platichthys umbrosus* of Dr. Girard (U. S. P. R. R. Rep. X., 149 1858), is identical with the species described by Ayres, while the *Lepidopsetta umbrosa* described by me (Proc. U. S. Nat. Mus. 1879, 106), is the one since described as *Isopsetta isolepis*.

This species is found along our coast from Monterey to Alaska, is rather common about rocky places, and is abundant in Puget Sound.

In size and weight it is about equal to *Psettichthys melanostictus* and *Hippoglossoides jordani*, and in quality ranks with the latter.

*Aphoristia atricauda*, Black-tailed Sole—This fish, although apparently too rare to be of economic value, since the only specimens extant are about six in number, and do not exceed six inches in length, is interesting as the only species of true sole found in California waters.

The Soleidæ have been separated as a distinct family from the flounders by Dr. Gill, the chief distinguishing character being the

smallness or absence of the pectorals. But as there is a regular gradation from species with large pectorals to those without any, this character is scarcely definite. In *Cynicoglossus* the pectorals are very small.

FAM. GADIDÆ—COD AND WHITING, ETC.

The Gadidæ are spineless fishes with cycloid or smooth scales, and usually with more than one dorsal and more than one anal fin. In economic importance this family ranks next to the salmon family, but it is only represented on the Pacific coast, U. S. A., by four species.

*Gadus morrhua*, Codfish—Although this fish does not belong to the fauna of California, and is not common even at the northern extremity of the Pacific coast of the United States proper, its economic importance renders it necessary to include it in this report. Dr. Bean, whose mission it has been to investigate the fishes of Alaska, believes the codfish of Alaska identical with *Gadus morrhua*, the common codfish of the banks of Newfoundland, and the adjacent regions; for the Alaskan cod is not a rock-cod (*Sebastichthys*), as are the so-called cod caught in California, nor is it even a hake, pollack, or whiting; but it is a true codfish, having three separate dorsal fins, two separate anal fins, and a small barbel under the chin.

It seems strange that such fishes as the species of *Sebastichthys*, possessed of rough or ctenoid scales, a spinous dorsal, three spines upon the anal fin, and numerous more or less developed spines on the head, should ever be popularly confounded with fishes like the true cod, which have not a spine upon body, head, or fins, and the scales of which are smooth or cycloid. Yet the confusion exists, and the names of cod and rock-cod, applied to the spiny fishes aforesaid, are the result of the confusion, and in their turn serve to perpetuate it.

Whether the cod-fish brought from the Sea of Okhotsh are of the same species as those from Alaska, remains to be proved.

Compared with the fishery of the Atlantic, that carried on upon this coast is comparatively insignificant, yet this does not arise from any scarcity of the fish, which is stated to abound among the numerous islands of the northwest coast, but from the want of a market sufficiently extensive to permit of its increase. The expense of trans-continental freight, and the smallness of the population between the Sierra Nevada and the Rocky Mountains practically limits the market to the Pacific States, although small quantities have been sent to South America, and some have been shipped to Australia.

The fishery was commenced about sixteen years ago, and at that date the salted fish sold at nine cents per pound. At the present time the best case cod is quoted at from three and a half to four cents per pound.

The total catch brought to San Francisco, amounted, in 1878, to about 1,500 tons, in 1879 to 1,800 tons. Thirteen or more vessels, large and small, are engaged in the trade, which furnishes employment, on an average, to about two hundred and fifty hands. The largest vessels are barks of about 350 tons, each having a crew of thirty men. The larger vessels are principally employed in the Okhotsh Sea fishery, while the smaller vessels, fore and aft rigged, are sent to the shores of Alaska, principally to the Choumagin Islands.



Those which go to the Okhotsh Sea make but one trip annually, leaving from the middle of March to the end of April, and returning from the end of June to October. Those which fish at the Choumagin Islands return earlier than those from the Okhotsh Sea, and occasionally take more than one trip. Last year one schooner made three trips, but her cargo each time was made up from the catch of other vessels that did not return. The smaller vessels are better fitted for the tortuous channels among the islands of Alaska than those of larger size.

On the coast of Alaska the fishery is usually carried on at depths of from ten to fifteen fathoms, but in the Sea of Okhotsh lines are used at forty to fifty fathoms. Both trawl lines and angle lines are used in the cod fishing of this coast. The latter are employed in deep water, the former where the depth is not too great, and the bottom is clear of rocks. Angle lines are exclusively used in the Sea of Okhotsh, and frequently also in Alaskan waters. A trawl line consists of a line to which a number of hooks are attached at regular distances by means of shorter lines, while a weight is secured to each end. Several trawl lines are paid out in succession, the position of each being indicated by means of buoys, one of which is fastened to each end of every trawl line. The trawls used in the Alaska cod fishery are often six hundred fathoms long (3,000 feet), and bear on each side a row of hooks at every half fathom, or thereabouts. After they are paid out, they are examined at intervals, and are drawn once or twice a day, according to the rate at which the fish take the bait.

An angle line bears two hooks, kept apart by a piece of wire, and has a heavy weight attached near the hooks. Each man manages two lines, one on each side of him, drawing one as soon as he lets down the other.

The use of the angle line instead of the trawl line in the Sea of Okhotsh is necessitated partly by the deep water, but partly by the abundance on the sand banks of a small crustacean, called by the fishermen a "sand flea," which attacks and devours the fish upon the trawl line before it can be drawn.

The fishermen are paid according to their catch, a fixed sum per thousand fish. At Kadiak, where some fishing is done, natives are employed to head, split, and salt the fish, and are paid from seventy-five cents to one dollar per day. The fish are treated in a manner similar to that employed in the Newfoundland fishery, the fish as they are caught are passed to the header, who removes the head; by him to the splitter, who cuts open the body and takes out the viscera. The catch is then stored in pickle, as the salted condition is called, until its arrival in the Bay of San Francisco, where it is dried in establishments erected for the purpose.

The quantity given above, as the total of the season's catch, does not include that taken by local fishermen along the various parts of the long line of coast between Behring's Strait and Puget Sound, at which latter place it is found, but in small quantity compared with its abundance in Alaskan waters.

The three principal firms engaged in the cod fishery, are Lynch & Hough, the Pacific Fish Company, and N. Bichardt & Co. The first named, which does a somewhat larger business than the second, carries on the fishery exclusively in the Sea of Okhotsh. It employs about one hundred and twelve men afloat, and from ten to fifteen at its drying establishment, which is situated at California City, near

San Quentin. When the bulk of the catch comes in, the force on the shore is increased to about sixty. At this establishment the fish is not dried in bulk, and then piled, as is done upon the Atlantic coast, and also in some cases on this coast, but is kept in pickle, in tanks of redwood lumber, and dried when required. This method is doubtless adopted partly on account of the limited demand caused by the small population of this coast, but it is claimed that better results are obtained by it. The piled up heaps of fish, however carefully dried, are liable in the more or less foggy atmosphere of our coast to "sweat" or ferment, to the great detriment of the article.

The tanks used to hold the stock are of redwood three inches thick, dovetailed at the angles, and without nails or any iron whatever. The fish are washed before drying, and when the latter process is complete, are sorted into three sizes; the largest, put up into wooden cases, are known as "case" fish, and fetch the highest price; the next size are made into bundles; while the smallest, after having been divested of skin, vertebræ, and fins, are cut in halves, packed in cases, and sold as "boneless codfish." Much of the work of preparing boneless cod can be done by boys. Great care is taken to insure perfect cleanliness at every step of the preparation, and in this respect much of the dried cod of this coast is certainly superior to that of Newfoundland.

The drying establishment of the Pacific Fish Company is situated upon a small island in Richardson's Bay, opposite to Saucelito.

The quality of preserved codfish depends, to a great extent, like that of all other salted articles, upon the quality of the salt used. The impurities, as they are called, of salt, are simply other ingredients naturally contained in sea water, and not taken out in the process of salt making. Ordinary sea water contains, besides common salt or chloride of sodium, sulphate of lime or gypsum (the material of plaster of Paris), and sulphate of magnesia. The proportions in which these enter into the composition of the solid residue, left after the evaporation of the water of the sea, may be seen from the following analysis: Analysis of water of San Francisco Bay, made December, 1879, by Prof. F. Gutzkow:

Chloride of sodium.....	0023.756
Chloride of potassium.....	0000.470
Chloride of magnesium.....	0003.030
Sulphate of lime.....	0001.263
Sulphate of magnesium (Epsom salts).....	0001.837
Bromide of magnesium.....	0000.025
Total solids.....	0030.381
Water.....	969.619
	1000.000

The salt used in curing codfish, as well as most of that used in salting meats, hides, etc., is made upon the salt marshes of Alameda County by the evaporation of sea water. Some makers simply evaporate, allowing all the impurities to remain, while others, knowing the degree of concentration at which the objectionable substances are deposited, adopt means to obtain really pure salt. Whatever success may be obtained by others, a personal examination of the works and methods adopted at the Pacific Union Salt Works has convinced the writer that the salt obtained by them is as nearly pure as salt can be, excelling in this respect even the best Liverpool salt, and it is satis-

factory to know that the greater portion of the codfish taken on this coast is cured with the salt made by this company.

The oil from the livers of these fish, which forms a valuable portion of the industry on the Atlantic coast, is not utilized here, nor are the "sounds," or swim bladders, put up for food purposes. As has been long ago remarked in the Atlantic, the fish occupying deep waters are superior to those found on the more accessible banks.

*Merlucius productus*, Ay., Hake—The *Merlucius productus* of Ayres may prove to be identical with the *vulgaris* of the European coasts. Until lately the examples brought to the markets of this city seldom exceeded eighteen inches in length, but during the present summer the Italian fishermen of Monterey have frequently caught individuals of two feet or more in length, and some of these have found their way to San Francisco. In consequence of the stout form of this fish, and its thickness and depth in the pectoral region, its weight is proportionately large, reaching eight pounds, or even ten.

*Pollachius chalcogrammus*, Pal., Pollack—This species, hitherto believed to be absent from the Californian coast, has lately been found in the market, to which it was brought from Monterey Bay. The only other Gadoid fish occurring in California is the well known Tom-cod (*Microgadus proximus*), which is not on record south of Monterey Bay, but ranges northward to Alaska.

#### CHIRIDÆ.

The somewhat heterogeneous group included under this title contributes at least seven species to the fauna of California, all of them of sufficient size, but only four of them sufficiently abundant for use as food. All have the character common to the *Chiridæ*, *Agonidæ*, *Cottidæ*, *Scorpenidæ*, etc., of a bony process uniting the sub-orbital ring with the preoperculum. Unlike the *Scorpenidæ*, and most of the *Cottidæ*, which have three and a half gills, the *Chiridæ* have four, and there is a slit behind the fourth—not present in *Scorpenids* (rock-cod), nor in some *Cottoids*. The dorsal and anal fins are usually long, but in *Anoplopoma* they are short. The scales are usually ctenoid (rough), but in *Ophiodon* they are cycloid. The scales in some species cover the entire body and head, but in others parts of the head are scaleless. *Chirus* has several lateral lines, but the other genera have but one. *Zaniolepis* and *Oxylebius* have three anal spines like the *Scorpenidæ*, and the latter would be a scorpenid were it not for the gill. *Anoplopoma* looks like a codfish or whiting and *Myriolepis* resembles a *Serranus*, or marine Percoid.

The family altogether is a refuge for a number of species that will not conveniently fit in anywhere else.

All the genera are confined to the North Pacific, and most of the species become more abundant northwards.

*Myriolepis zonifer*, Ln., is as yet known from a single example only, found in the market of San Francisco. The ctenoid scales cover body, head, and fins, except dorsal; and its general appearance much resembles that of a young Jew-fish, *Stereolepis gigas*. The coloration is black transverse bands on a whitish ground. *Oxylebius pictus*, Gill, may be known at sight by the six vertical cross bands on a yellow ground, barred fins, first dorsal of fifteen spines, anal with three, and especially by its elongated snout and small mouth. It is not very rare at Monterey, living among rocks in clear water near shore. From

its small mouth and peculiar habits it is seldom taken except in dip-nets baited with crushed crabs. Its range extends northward beyond California.

*Chirus pictus*, Painted Sea Trout—This species is not at all common in the San Francisco market, but becomes more abundant in higher latitudes. It is often beautifully colored when fresh with blotches of bright green upon a dark brown ground. In alcohol these blotches become purple. In size, quality, and food it is identical with the next species.

*Chirus decagrammus*, Bodieron, Sea Trout, Boregat—It has always been supposed that *Chirus guttatus*, which is covered with yellow roundish spots upon a bluish gray ground, was perfectly distinct from *Chirus constellatus*, which has more or less perfect circlets of dark spots surrounding areas of a brighter blue than the rest of the body; but Professor Jordan has examined numerous specimens of both forms, and finds that all the *constellatus* are male, while all the *guttatus* are female. The two forms always occur together, and in about equal numbers, and the fishermen consider them identical. Professor Jordan believes that both names will have to give place to *Chirus decagrammus*, Pallas, which is probably the same species, as surmised long ago by Dr. A. Gunther. This species is everywhere moderately common from San Luis Obispo northward, especially in Monterey Bay. It is also common in San Francisco Bay, and abundant in the markets throughout the year. It feeds chiefly on crustacea and worms, and spawns in July. It is a tolerably good food fish, but inferior to the rock cod or green cod (*Ophiodon*).

It dies very soon after it is taken from the water, and the flesh softens very quickly. It reaches two or three pounds in weight.

A form with longitudinal series of yellowish blotches along the sides, once believed by me to be distinct, will probably prove to be only a variety of the female.

This form is described in the Proc. U. S. Nat. Mus. 1880, 55.

*Anoplopoma fimbria*, Candle Fish—This, though essentially a northern form, occurs along the coast as far south as Monterey. Until recently, it has been rare in the markets of San Francisco, but last year it was present in tolerable quantity, and during the present year (1880) may be almost called common. At Seattle it is very abundant, and is taken with hook and line from the wharves. At Monterey the Chinese take it with hook and line, while those caught outside San Francisco Bay are taken with sweep nets. It feeds on crustacea, worms, and small fishes, and reaches a length of twenty inches, and a weight of four to five pounds. This is not greatly esteemed as a food fish, but is sometimes fraudulently sold as Spanish mackerel.

*Zaniolepis latipinnis*, Long-finned Zany—As this fish has no vernacular title, and is not sufficiently common to acquire one from the fishermen, that given above is suggested. Though of no importance as a food fish, its singular appearance merits notice. In color, it is greenish-yellow, with blackish dots and bars upon the fins, and the surface of the skin is covered with prickles. These prickles are comb-like points radiating from scales that are buried in the skin. The first dorsal spine is long, the second longer, projecting far beyond the others, and often equal in length to half that of the fish. It does not exceed a foot in length.

*Ophiodon elongatus*, Buffalo Cod, Green Cod, Ln.—This has the

reputation of being one of the most rapacious fishes of the coast. The various species of rock cod (*Scorpenidae*) often come into the market mutilated, having lost a portion of the posterior part of the body. The dealers do not attribute this to the sharks, but to the green cod, which, they say, seldom or never takes the hook itself, but, darting out of its hiding place among the rocks in pursuit of the rock fish upon the hook, is caught and brought up along with it. It attains far larger dimensions than any of its brethren, among either the *Chiridae* or *Scorpenidae*, reaching a length of four feet. Its range extends along the greater part of the coast of California, but it is most abundant from Monterey northward. Professor Jordan states that it feeds on crustacea and squid, as well as upon other fishes; and that northward from San Francisco it attains a length of five to six feet, and a weight of from fifty to sixty pounds. The flesh is usually of a pale livid hue. On various parts of the coast it is taken with gill nets, as well as with hook and line. As a food fish it ranks high, and its size and abundance render it one of the most important species. Many are dried by the Chinese and Indians.

#### FAM. SCORPENIDÆ.

The species of rock cod or *Sebastichthys*, known previous to the present year, were eleven in number, and with *Sebastes paucispinis* and *Scorpena guttata*, made a total of thirteen *Scorpenidae* peculiar to the coast of California.

To his own great surprise Professor Jordan has, during his stay here as Fish Commissioner, more than doubled this list; so that now twenty-five species of *Sebastichthys* are known to occur, besides one more northern form, making, with the other genera, a total of twenty-seven fishes belonging to this family on the coast of California.

Several of the forms described by Professor Jordan had been observed by the writer on previous occasions in the markets of San Francisco, but their resemblance to species already described was so great, the differences amounting often only to the greater or less development of certain spines upon the head, or to peculiarities of coloration, that, lacking the facilities for procuring an extended series, he did not venture to describe any of them as new, the more because the series of rock cod was already suspected by naturalists to be too long. But Professor Jordan, by an extended examination of numerous specimens of every species, of all ages and of both sexes, has proved that the characters which separate the various forms, slight though they may at first appear to be, are constant and thus of specific value. The spines upon the head, by their greater or less development, serration or by the addition of an extra pair; the gill-rakers; the form and height of the spinous dorsal; in a few cases the number of rays of the second dorsals and anal, and in all the species the pattern of the coloration are the characters relied upon to distinguish the species. The coloration is very constant in this group, so much so that a change in its pattern, or even in its color, is usually significant of a change of species. The twenty-five species of *Sebastichthys* all occur in the Bay of Monterey, and many of them at Santa Barbara. The Portuguese fishermen, who fish in deep water, give to the species they take distinctive names, and are perfectly well aware that they are different; but the Italians con-

found the shallow water species under one common title. The spines upon the top of the head are most developed in *S. nigrocinctus*, and in this respect *S. serriceps* comes next. Both are rare in the markets of San Francisco; the first the rarer, and both are black-banded. In the attempt to give his fish a descriptive name, Ayres called the former *nigrocinctus*, or black-banded, a name which applies better to the second species; while *serriceps* or sawhead would fit *nigrocinctus* even better than it fits the species to which it is applied. Ayres observed *serriceps* as long ago as 1859, for he remarks to this effect: "There is in the markets occasionally another fish of the *nigrocinctus* type which may eventually prove distinct." The spines or spinous ridges on the head of the fishes of this genus are an anterior pair upon the snout (nasals,) a posterior pair on the back of the head (occipitals,) and between these three pairs which, from their position, are called pre-ocular, supra-ocular, and tympanic. A pair of post-oculars, dismembered from the supra-oculars, is often present, and some have a pair of spines called "nuchal," behind the occipitals. In *nigrocinctus* the nuchal and tympanic pairs are wanting, but the others rise into high ridges with undulating or jagged edges. In *serriceps* the nuchal pair is present, and all the ridges end posteriorly in sharp spines rising well above the surface of the head.

*S. nebulosus*, *chrysomelas* and *carnatus* are a trio of fishes exceedingly similar in appearance, differing, in fact, only in coloration, and with only one or two specimens of each to look at, it is difficult to believe in their distinctness; yet, when one has seen lying, side by side, a hundred examples of *S. carnatus*, all exhibiting red spots in almost exactly the same positions of the yellow ones of *nebulosus*, and when one has seen a pile of *chrysomelas* with its characteristic broad yellow band from front of dorsal to tail, following nearly the same line as the principal spots of the *nebulosus*, and when this color difference has been correlated with certain differences in the form of the body and head, it is difficult to avoid the conclusion that we have here three distinct yet very closely related forms.

*S. maliger* and *S. vexillaris* may be known from all others by their very high spinous dorsal, with the membrane deeply emarginated between each spine, and from each other by the bright chrome yellow tint of the former.

In all the foregoing species the jaws are equal in length or nearly so, and the form of the body is short and thick; the greatest depth equal to or more than one third of the length of the fish. *Nigrocinctus* and *chrysomelas* are remarkable for the great width of the body at the origin of the dorsal, and for the abruptly shelving form of the nape and top of head. In the succeeding species the jaws are still nearly equal, but the body is more elongated. *S. rastrelliger* may at once be known by a glance at the gills, or rather at the gill-rakers, or comb-like teeth set upon the inner or throat side of the bones bearing the gills. In all the other species these are more or less elongate, but in this they are often broader than they are long. This is an exceedingly dark colored species, dark brown, clouded with still darker, and the dorsal fin is very low.

*S. auriculatus*, the common rock-fish of the bay, may be identified by the black spot upon the tip of the gill-cover; *S. rubrivinctus*, which rarely, if ever, comes to the markets of San Francisco, by the broad transverse stripes of red and yellow upon its body; and *S. ruber* by its deep uniform red tint, large size, and broad, flat preopercular spines.

*S. auriculatus* may also be known by the pair of small coronal spines near the median line of the skull.

*S. constellatus* and *S. rosaceus* have four or five light pink spots upon their dorsal outline, and the former is covered on back and flanks with small white spots. *S. chlorostictus* is similar to these in many respects, but may be known by the green spots scattered over its upper portions and dorsal fin, as well as by the greater height of the spinous part of the latter.

*S. rhodochloris* resembles *rosaceus*. *S. minatus* is of a deep red tint, darker even than *ruber*, and is without the broad, flat preopercular spines which characterize that species. From *S. pinniger* it may be known by the rough scales which cover the entire head, even to the tip of the jaws.

*S. pinniger*, the *rosaceus* of Ayres, is usually more or less orange, with maroon blotches, and the fins, except the dorsal, are bright red. The scales on the head are not rough. Occasionally this species exhibits large blotches of black.

We started with species in which the spines were well developed, and have now reached those in which they are either present, but slightly developed, or are reduced in number. Moreover, in the remaining species the lower jaw protrudes beyond the upper, the protrusion increasing as we proceed.

*S. elongatus* has its greatest depth contained some four and a half times in its total length, and the gill-rakers long, equal to more than half the diameter of the eye, which is very large. The interorbital space is slightly concave.

*S. proriger* is nearly as elongate as the last species, but the outline of the back is more rounded; the gill-rakers are longer, the eye smaller, and the forehead or interorbital space is slightly convex. In both species the body is irregularly banded with lighter and darker longitudinal bands, and the lateral line lies on a decided light streak.

*S. ovalis* may be readily distinguished from the two preceding by its much more ovate form, as well as by the almost uniform height of the dorsal, and its still more protruding lower jaw.

In *S. entomelas* the second anal spine is about equal in length to the third, the spines upon the head are very small, and hidden by the scales, and the peritonæum, or lining of the abdomen, is black, whence the specific name.

*S. mystinus*—*S. melanops*—Ay: is the most abundant species in the markets, and is generally distinguished by dealers as the Black Rock Cod. Its black color at once distinguishes it from all other species, the nearest to it in this respect being *S. ciliatus*, which, however, is spotted with black upon a gray ground. In *S. mystinus*, the top of the head is spineless, but there is a small tubercle in the place of the preorbital spine, which tubercle is absent in *S. ciliatus*, which is identical with *S. melanops*, Gir., and with *S. simulans*, Gill.

*S. flavidus* is greenish yellow, and might be called the Yellow Rock Cod, were it not for the brighter yellow of some portions of *maliger* and *rubrivinctus*. The projection of the lower jaw reaches its maximum in this species, its tip entering into the dorsal outline, and the gill-rakers are very long and slender, equal in length to three fourths of the diameter of the eye. In the three last species, the third anal spine is longest, and the anal rays eight in number. Small nasal spines are present.

*Sebastes paucipinis*, Small scaled Rockfish, is placed in another genus on account of its small scales, straight back, and other peculiarities. The snout is almost twice as long as the diameter of the eye; there are nine anal rays, and the third anal spine is longest. A few economic particulars of these species may prove interesting:

*S. nigrocinctus*, the Black, or rather the Dark Brown banded Rock Cod, is found from Monterey to Puget Sound, and is tolerably abundant, in very deep water, in the Straits of Fuca. About San Francisco it is rare. It reaches a weight of four pounds.

*S. serriceps*, the Saw-head or Tree fish, is more southern in its range, but is abundant in rather deep water about Santa Catalina Island. The bands are decidedly black, instead of dark brown, as in *nigrocinctus*, and are more numerous than in that species. Northern specimens are larger, paler, and more brightly colored than southern. It reaches about three pounds, and is rare in the markets of San Francisco, though met with more frequently than the preceding.

*S. carnatus*, *S. nebulosus*, and *S. chrysomelas* are known to the fishermen by the name of Garrupa. The first is taken in great numbers with gill nets in rather shallow water, and is occasionally abundant in our markets. It is rare at Santa Barbara, and has not yet been noticed north of San Francisco. It reaches a weight of about two and a half pounds. It is classed with *atrovirens*, *flavidus*, *nebulosus*, and others, and is accounted a good food fish.

*S. nebulosus* is about equal in size and weight to the preceding, but is found in rather deeper water, and is scarcely so abundant.

*S. chrysomelas*, the Yellow-Banded Rock Cod, ranges from San Pedro to Puget Sound, and becomes more abundant northward. It occurs in water of moderate depth, and is taken with hook and gill nets. It reaches three and a half pounds.

*S. maliger* is found in rather deep water, and is commonest in the Straits of Fuca, where it is taken with hook and line. Occasionally it occurs in the San Francisco markets. It is larger than any of the preceding species, reaching a weight of six pounds.

*S. rastrelliger*, Garrupa, Dusky Rockfish, is not very rare in our markets, and reaches a weight about equal to that of the latter. About the Santa Barbara Islands it is taken with hook and line and with gill nets, rarely with seines. It is esteemed as food.

*S. auriculatus*, Wharf Rock-fish, is in individuals the most common of all the group in the San Francisco markets; and as it is plentiful in the bay, and is taken throughout the year, the total weight of the species brought in is probably about equal to that of *S. mystinus*, notwithstanding its smaller size. It is the only kind that frequents shallow bays, and is taken near shore from wharves and similar places, with hook and line. It reaches a weight of three pounds, but the greater part of those brought into the markets of San Francisco are young, and do not weigh more than half a pound.

*S. vexillaris* is the most variably colored and one of the most widely spread of the species, ranging from San Diego to Puget's Sound. It reaches a weight of five or six pounds, and is occasionally tolerably abundant in the markets of our city.

*S. chlorostictus*—Green-spotted Rockfish, the Pesce Verniglia of the Italian fishermen, reaches a weight of four pounds, and is known only from Monterey Bay, where it occurs in considerable abundance along with the three following:

*S. rhodochloris*—Fly Fish, is only known from Monterey Bay. It



is occasionally sent to San Francisco in considerable abundance in spring. It is not a large species.

*S. rosaceus*—Corsair. This is the smallest of the group, rarely exceeding one and a half pounds. It occurs among reefs in deep water, and where found is the most abundant of the red species. In San Francisco market it is abundant throughout the year.

*S. constellatus*—Bagre. This is another deep water southern species, taken with hook and line only. It is rather abundant, and of frequent occurrence in our markets. Together with the preceding small red species, it spawns at Monterey early in the spring. It reaches from two to three pounds.

*S. rubrivinctus* is appropriately styled the Spanish Flag by the Portuguese fishermen of Santa Barbara, on account of its gay red and yellow transverse bands. It occurs on reefs in very deep water, and is occasionally taken with hook and line in spring. It reaches a weight of six pounds.

*S. ruber*—Large Red Rockfish, Tambor, is probably the largest of all the species, reaching a weight of twelve pounds, or even more. It is graded upon the stalls with *pinniger* and *miniatus*, from which the dealers do not distinguish it. Its range extends to Puget's Sound, and its habitat is deep water, so that it is taken with hook and line. Professor Jordan, from whom all our additional knowledge of this group is derived, mentions that about Victoria the skulls of large specimens are infested with an encysted parasitic worm.

*S. miniatus*, Rasher, Rascira—Another deep water species, taken with hook and line, and also with gill nets, and occasionally sent to the city markets in considerable numbers. It is scarcely as large as *S. ruber*, but reaches eight or ten pounds, and is equally esteemed.

*S. pinniger*, Smooth Red Rock Fish, Hiaume. This is a deep water species, abundant everywhere from Monterey northward, and taken in great numbers, usually with set lines. It is probably the most abundant of all the red species in the San Francisco markets, and in size is inferior only to *S. ruber*, since it reaches a weight of from eight to ten pounds. It is esteemed as food, except when very large, when its flesh is rather coarse. Many are split and salted in the deep waters of Puget Sound.

*S. atrovirens*, Garrupa—Dark Greenish Rock Fish, abundant in rocky places in rather shallow water, and taken in great numbers in gill nets, south of Point Conception. Many are taken during Winter at the Santa Barbara Islands, and considerable numbers are salted and dried by the Chinamen. It reaches three pounds.

*S. elongatus*, Reina—Abundant with *S. proriger* in very deep water. Weighs about two pounds, and is not common in markets except in spring.

*S. proriger* rarely exceeds one and a half pounds in weight. Not rare in its haunts about Monterey Bay. In quality similar to other small red species.

*S. ovalis*, Viuda, Widow—A southern species, taken with hook and line in very deep water, and apparently somewhat rare. This species and *rubrivinctus* have not been observed in the San Francisco markets either by Professor Jordan or by myself, yet Ayres' type was procured there.

*S. entomelas*, Black-bellied Rock Fish—At present the least abundant of the group, and known only from Monterey Bay, where it is

taken with hook and line in very deep water. This and the preceding are equal in size and value to the next.

*S. flavidus*, Yellow Tail—Not common in Puget Sound, but very abundant in Monterey Bay and about San Francisco. It occurs in both deep and shallow water, and is taken in large numbers both with gill nets and set lines. It is one of the largest of the group, reaching a weight of six to seven pounds, and is considered one of the best.

*S. mystinus*, Black Bass, Black Rock Cod, Black Garrupa, Pesce Pretre—More common about Monterey and San Francisco than either southward or northward of those points, and sent from Monterey and Tomales Bay to the San Francisco markets in greater quantity than any other, although from its dark color it is less salable than the more brightly tinted species. Large quantities are wasted, especially in autumn, when they fail to find purchasers at a cent per pound. It is found in rather shallow waters, is mostly taken in gill nets, and reaches a weight of five pounds.

*S. ciliatus*, Black-spotted Bass. This fish, in size, habits, and value, is similar to the preceding, and is by no means rare in the markets of San Francisco. It is most common in Puget Sound.

*Sebastes paucispinis*, Boccaccio, Merou, Jack—The Italian "Boccaccio" or big mouth, fits this fish well. It is a large species, reaching a weight of from twelve to fourteen pounds, and a length of two feet eight inches. It is one of the best food fishes, and although not very common at San Francisco, becomes more abundant southward. The adults inhabit reefs in deep water, but the young come near shore in the Spring, and are taken from the wharves.

The rock fish generally live on small fish and crustacea. They spawn early in the spring, and some at least are viviparous. The young of the *S. flavidus* are extruded at a length of over one third of an inch, and the same is the case with *nebulosus*, *rosaceus*, *carnatus*, etc. Probably the whole group is viviparous. The first to notice this peculiarity was the Californian ichthyologist, Dr. W. O. Ayres, whose observations have in most cases stood the test of examination.

#### FAM. STROMATEIDÆ.

This family, a subdivision of the Scombridæ of Cuvier, is characterized by the presence of spinous processes from the vertebræ, forming teeth in the œsophagus, as well as by the absence of ventral fins. Only one species is known to occur upon our coast.

*Stromateus simillimus*, Pompino—This highly valued species occurs along the entire Pacific coast of the United States, having been seen in Puget Sound in the summer. It moves from place to place rather irregularly, appearing in schools at almost any season. It is but a small fish, rarely exceeding half a pound in weight, but its flesh is rich and fat, and its name helps to sell it, so that it readily fetches from twenty-five to fifty cents per pound. It is taken in seines, with hook and line, or by grabhook from the wharves.

A very curious monstrous example of this fish was brought to San Francisco market in the autumn of 1879. This individual was possessed of two mouths, externally alike, equal in size, and similar in structure; the lower mouth, situated somewhat behind the upper, directly beneath the eye, and in front of that bone of the gill cover

which is denominated by naturalists the interoperculum, while the upper was in the usual position.

#### FAM. CARANGIDÆ.

Most of the species of this family, which is a subdivision of the old mackerel family (*Scombridæ*), that occur upon this coast, are widely spread and well known forms, and the presence of some of them was not suspected until Professor Jordan commenced his researches in the Spring of this year.

*Trachymotus ovatus*, a form more nearly allied to the New Orleans Pompino than is the fish which bears that name at San Francisco, was recorded by the writer as from Lower California in 1876, and probably extends as far north as San Diego.

*T. pampanus*, also found on the Atlantic coast of North America, occurs in Lower California, but has not yet been met with within the limits of our State. It may readily be known from *T. ovatus* by its more elongate body, accompanied by longer dorsal and anal fins, and by its darker color.

*Trachurus saurus*, the Horse Mackerel, is an old friend of the Levantines who carry on here the same occupations they pursue in the Mediterranean. Occasionally it strays up the coast as far north as San Francisco. It is taken in large numbers in seines, and salted for bait. It may be known from all other fishes found in the markets of San Francisco by the row of keeled plates along the center of the posterior part of the body for its entire length.

*Caranx caballus* may be known from the last species by the limitation of the keeled plates to the posterior portion of the body, as well as by a black patch upon the operculum.

*Naucrates ductor*, the Pilot-fish of authors—that small oceanic fish which is said to guide the shark to his prey—is said to occur south of Point Concepcion. It may readily be distinguished by the darker vertical bands across its bluish flanks.

*Selene argentea* is another species, found both in the Atlantic and Pacific, but at present not known to occur in the waters of our State, although, as it is common in Magdalena Bay, it is not improbable it may straggle farther northward. It is excessively compressed and thin, the top of the head almost vertical, so that it looks highly intellectual. The anterior rays of the dorsal and anal are very long.

*Seriola lalandi*—This is the well known Yellow-tail of the coasts of the tropics, and South America and Africa. At present, it is on record from this coast only from San Diego and the Coronados Islands northward to Santa Barbara, where it is abundant in the summer, spawning about July and August. In winter it is not seen. It is taken entirely by trolling, sometimes in considerable numbers, and as a fresh fish, ranks somewhat below the Barracuda. When dried, it is considered equal to the Barracuda, or to *Caulolatilus*.

It feeds upon squid and small fishes, and reaches a weight of fifty to sixty pounds, and a length of four to four and a half feet.

The curious Remoras, which have a sucking disk of large size occupying the whole of the upper side of the head and nape, constitute a small family, nearly related, in some respects, to the Carangidæ and Scombridæ, or mackerel family.

The sucking disk is a transformed spinous dorsal, and consists of a number (varying according to species) of transverse laminae united

to a central bar, and capable of being raised or closed like the slats of a set of blinds. By means of this sucker, the *Remora* attaches itself to a shark, a ship, or other floating object, and allows itself to be carried wherever its host pleases, thus economizing labor. An example of *Remora jacobæa*, which has seventeen to nineteen laminae in its disk, was last year taken in the Bay of San Francisco from the body of a shark, which it had accompanied in its wanderings. The larger *Echeneis naucrates* has also occurred at San Francisco.

#### FAM. SCOMBRIDÆ.

All the true Scombridæ have a greater or less number of finlets behind the soft dorsal and soft anal, each finlet consisting of a single ray followed by a membrane of triangular shape.

There is little to separate them from the *Carangidæ*, except the non-protractile mouth; and one genus bridges over this difference. All are oceanic and swim in large schools.

*Scomber pneumatophorus*, Spanish Mackerel—This species is known also as Easter Mackerel, and Little Mackerel, and occurs from Monterey Bay southward, coming up in irregular and often large schools in summer and fall. It is occasionally sent to the markets of San Francisco. It does not exceed fourteen inches in length.

*Scomber scombrus*, Mackerel—There is little doubt of the occurrence of this fish upon the southern part of the California coast, although Professor Jordan did not see it. Captain Charles Willughby, Indian Agent at Neah Bay, and formerly a Massachusetts mackerel fisher, gave information that he once netted a school of Eastern mackerel off Catalina Island; and a fisherman at Santa Barbara claimed to have taken it off Anacapa Island.

*Scomberomorus concolor*—This species is here called the Spanish Mackerel, is very rare, is held in high repute, and fetches a high price. It may be known by its slim form, and toothless palate. This is the *Chromitira concolor* of my previous report. The nearest of kin to this fish is the *Cybius maculatus* of the Atlantic Coast.

La Cepedes's name *Scomberomorus* has precedence of *Cybius*, and as *S. maculatus* has the palate toothless, our Spanish Mackerel must be included in the same genus. Minute papillæ upon palate and other parts of the internal surface of mouth and gill-cavity are possessed by both species, but the only true teeth are those in the jaws.

*Sarda chilensis*, Bonito, Skip-jack—This is not identical with the European bonito, although it belongs to the same genus. It was first described from Chili, and is known to occur along our coast as far north as Monterey Bay. In the summer it is very abundant, and is taken in great numbers by trolling, especially about Santa Barbara and San Diego. Many are salted and dried, but the flesh is rather coarse, and is considered inferior to the Barracuda and Yellow-tail. Some persons aver that it makes them sick. It reaches an average weight of about twelve pounds, and sells at about twenty-five cents in the localities where it is taken. About August it becomes abundant in the markets of San Francisco, so much so, that it frequently cannot be sold while fresh.

*Oreynus alalunga*, Albicore—This is one of those widely spread species which confound the best efforts of naturalists who have not had abundant opportunity for comparison. As *Thynnus pacificus*, this species was described by Cuvier, and Valenciennes, and again,

under the name of *Orcynus pacificus*, by Cooper in 1863 (Proc. Acad. Nat. Sci. III, 75), but Professor Jordan considers, from examination of fresh specimens, that it is identical with the well known *Thynnus* (*Orcynus*) *alalonga* of the Mediterranean and Atlantic, the alalonga or long-wing of the Italians. There is no mistaking the fish for any other found upon our coast. Its long pectoral fin, reaching a considerable distance beyond the second dorsal fin, is a distinctive mark which none can overlook. The first dorsal is long, and has fourteen spines, while the second, of twelve soft rays, is followed by eight finlets, or separate rays, each with a membrane attached. The anal has eight separate finlets. In color it is steel blue upon the sides, becoming blackish above, and silvery white below.

It occurs in the Bay of Monterey in the later months of summer; is brought occasionally to San Francisco market, and becomes abundant farther southward, notably among the islands of the Santa Barbara channel. It affords excellent sport, being caught by trolling while sailing very rapidly, and biting voraciously at a white rag. Those brought to the markets of San Francisco were caught from the deck of a vessel.

It frequents deeper water than the bonito, and in Santa Barbara channel is rarely taken within six miles of the shore.

Like the bonito, it feeds chiefly on anchovy and squid, but is occasionally taken with rare deep water fishes in its stomach.

It reaches greater weight, is comparatively deeper in form than the bonito, and is less valued even than that fish.

Another species of *Orcynus*, probably *O. pelamys*, also a Mediterranean species, is known to occur on our coast; and a *dolphin* (*Coryphæna*) species unknown, is known from an individual once washed ashore at Cayucos Landing.

#### FAM. LABRIDÆ.

The Labridæ, or Wrasse family, a numerous tribe of fishes, is but poorly represented upon the coast of California, where its place is to a great extent filled by the Embiotocidæ, or viviparous perch. The Labridæ have a single dorsal, the spinous portion of which is at least as much developed as the soft, and are covered with cycloid scales of moderate or large size. The lips, as the name indicates, are largely developed, and the mouth is capable of great protraction, the length of the ascending processes of the intermaxillaries, or upper jaw bones, permitting much forward movement.

Many of the fishes of this family are beautifully colored, and most of them attain dimensions that render them valuable as food fishes.

The Labridæ live largely upon mollusks, and some are more or less herbivorous.

*Pimelometopon pulcher*, first described by Dr. W. O. Ayres, under the more pronounceable name of *Labrus pulcher*, is, as its name implies, a highly colored fish. Its chief adornment consists of a bright red band extending across the body from the head to a perpendicular from the anus, contrasting strongly with the black head and hinder portions of the body. This is one of those species which prove that it will not do to attach too much importance to comparative proportions of depth to length, since the depth and thickness of the front portion of the body increases with age so much, that one of

those mathematical naturalists who seek to bind nature to fixed rules might make several species out of it. It attains a length of two feet or more, and a weight of from twelve to fifteen pounds. It is very abundant in the kelp south of Point Concepcion, and is taken in immense numbers by the Chinese, who dry and salt it.

The flesh is rather coarse, but the fat forehead is esteemed for chowder. It feeds upon crustacea and mollusks. Rare instances of its occurrence at Monterey are on record.

*PlatyGLOSSUS modestus*, King-fish—This species shares with several others, in no wise related to it, the names of king-fish and sea-trout. It is rarely brought to the markets of San Francisco, yet it is of common occurrence in the Bay of Monterey, and from that point southward. It is a shallow water species, and frequents the kelp that floats near the shore, and is taken from the wharf at Monterey in dip nets.

When fresh, the adults are far from deserving the name of *modestus*, since they are decorated with waving, broken lines of bright green upon the sides of the head, are bright orange red below, becoming brown above, and have the front edge of each scale marked with a line of green. The first dorsal is bright blue at the base; there is a dark green or blue spot at the upper pectoral axil, and a black blotch on the base of the tail-fin.

The young are much less brightly tinted, the green lines are not conspicuous, and the color is olivaceous above, fading into whitish below. It is common in the kelp, and is often taken with hook and line, or with baited dip net. It is chiefly used for bait, although its flesh is said to be of good quality.

*PlatyGLOSSUS semicinctus*, the Kelp Fish, is not rare in the kelp from Santa Catalina southward, and at San Pedro is occasionally taken in gill nets and sometimes with the hook. It is larger than the last species, reaching about a pound in weight.

#### FAM. POMACENTRIDÆ.

Of this family, which includes numerous short-bodied, large-scaled fishes with the lower pharyngeal bones united, only three species are known to occur upon our coast, and neither of these ranges north of Point Concepcion.

*Hypsipops rubicundus*, Garibaldi, Red Perch—This species is abundant at the Santa Barbara Islands and southwards; is taken chiefly with gill nets; reaches a weight of three or four pounds, and is not held in high esteem as food.

*Chromis punctipinnis*, known as the Blacksmith, is abundant in the same localities as the last, and is taken with gill nets, or with hook and line. It reaches two pounds in weight, but is not valued. Like the other species of the tribe, it feeds on shell fish and crustacea.

#### FAM. EMBIOTOCIDÆ.

This curious tribe of viviparous fishes has had its numbers increased by the addition of three species, described by Messrs. Jordan and Gilbert, and all occurring in the markets of San Francisco.

One of these, *Ditrema atripes*, is exceedingly like the better known *Ditrema (Phanerodon) furcatum*, but is larger, and may be distinguished by the darker tint of the sides, becoming still darker on

the back, where the ground color is interspersed with small streaks of dard red; as well as by the black-tipped ventrals. This species is occasionally sent to market in considerable numbers from Monterey, where it is taken in seines.

*Brachyistius rosaceus* is a pretty little pinkish fish, with two darker spots on each side near the base of the soft dorsal.

The first specimen observed in the market was treasured by the dealer as a curiosity, and the second was secured by the writer for Professor Jordan, who has since obtained two or three others. It is rare, and at present only known from the markets of San Francisco.

*Abeona aurora* is, from the structure of the teeth, nearly related to the Least Shiner, (*Abeona minima*) but does not very closely resemble it, in general appearance, and is larger. It may be identified by the brassy streak which extends along the body from the snout to the base of the caudal, and by the blackish axil of the pectoral, and the considerably forked tail fin. At present it is certainly known only from Monterey Bay, where it is very abundant about rocks. Many inhabit the larger rock pools at Point Pinos. It reaches about a third of a pound in weight.

Some alterations have been made in the nomenclature of this group. The short, broad species, called by Gibbons' *Hyperprosopon* have, together with *Hypercritichthys* of Gill, been placed by Professor Jordan in *Holconotus*, (Agassiz) from which they are not distinguished by any structural character; and for similar reasons the genera *Phanerodon* of Girard and *Tæniotoca* of Agassiz have been merged in *Embiotoca*, which must itself give way for the older name of *Ditrema*, since the species which of all the group was first described, namely, *Ditrema temmincki*, a Japanese fish, turns out to be, according to Professor Jordan, generically identical with *Embiotoca* of our own coast.

As food fishes, the Embiotocidæ are far inferior to the other leading groups of the coast, but their abundance in species and in individuals renders them valuable. All the tribe feed upon crustacea and small fishes.

The great peculiarity of this tribe does not consist so much in the mere fact that the eggs are hatched within the body of the mother, since this occurs also in the large group of rock cod; but in the small number and high state of development of the young, and in the modifications of structure of males and females, resulting in an evident differentiation of the sexes. The eggs are hatched, and afterwards the young develop, within the ovaries, which are developed for the purpose into a number of pouches or rather folds, and from which they escape into the sea through the vulva. There is no trace of any connection of any kind between the young and their parent; no rudimentary placenta, as there is in some sharks. The males have the anal fin constructed differently to that of the females, and it is probable that some sort of copulation takes place, as the eggs must be fecundated while within the ovary. The hard structure in the anal fin of the male is a clasping organ.

In most genera there is between the ventral fins and the anal an elongated naked area, forming a groove, and between the basis of the ventrals is a lance-shaped blade, covered with scales, its free tip overhanging the front of the scaleless area.

From Professor Jordan's notes I glean the following fresh particu-

lars respecting the previously known species, which were treated of more fully in the report for 1879.

*Rhacochilus toxotes*, is known to the fishermen as the Alfione, bring forth from fifteen to twenty young in summer, and is considered the best of the group.

*Damalichthys argyrosomus*, ranges northward to Puget Sound, where it is exceedingly abundant; is probably of all the species the third most numerous in individuals, and in quantity ranks next to the preceding. It is called White Perch.

*Ditrema furcatum* (*Phanerodon furcatus*, Gir.) lives in sheltered bays and is taken in seines in great numbers; is very abundant from San Francisco southward, but has not been noticed north.

*Ditrema laterale*, Surf Fish, Blue Perch—This species is very abundant north of our State, reaching to Puget Sound, and is on the whole, the most common of the large species.

*Ditrema jacksoni*, the Black Perch, Pogy, or Black Bass, belongs especially to California, but extends to Puget Sound.

*Hypsurus caryi*, Bugara—This fish is usually very abundant at the edge of the kelp, especially at Monterey, where it is often taken with hook and line, or in baited dip nets, and sometimes in great numbers in seines. It is used chiefly for bait for rock cod; but the larger ones are sent to market.

*Amphistichus argenteus*, Silver Surf-fish—called by the fishermen Surf-fish and White Perch, is, on some sandy shores, very abundant, especially in the surf. At Santa Barbara and Soquel, it is more common than elsewhere.

*Holconotus rhodoterus*, which may be called the Red-finned Perch, is not so common as most of the others, except in certain localities, one of which is Soquel. It reaches about a pound and a half in weight.

*Holconotus agassizii* (*Hyperprosopon agassizii*) is, like the preceding, known to range from Tomales to Santa Barbara, and is small, rarely weighing over half a pound.

*Holconotus* (*Hyperprosopon*) *argenteus*, Wall-eye or Silver Perch—is everywhere abundant, and is taken in great numbers in seines on sandy shores, as well as with hook and line from wharves. It is not much esteemed as food, and is small—usually weighing about half a pound.

*Holconotus analis*. Only locally abundant; common at Santa Cruz and Soquel, where large quantities are taken, along with the Shiner (*Cymatogaster aggregatus*), as bait for rockfish. As it does not weigh more than a quarter of a pound, it is seldom brought to market.

*Brachyistius frenatus*. Widely distributed, and at some localities, as at Monterey, Point Reyes, etc., very abundant; but used chiefly for bait, on account of its small size (quarter pound), and not sent to market, unless accidentally mixed with other species. Ranges to Puget Sound.

*Cymatogaster aggregatus*, Shiner, Sparada, Minnie, Little Perch—This is, everywhere, from San Diego to Puget Sound, the most abundant of the group, and is found especially in sheltered bays. It is about equal in size to the last.

*Abconia minima*, Shiner—The smallest of the tribe.

Most of these species occur in the Bay of San Francisco, and all that weigh half a pound or over are sent to market. The most important, as regards the weight actually sold, are *Dit. jacksoni*, *D.*



*laterale*, *D. furcatum*, *Rhacochilus toxotes*, *Damalichthys argyrosoma*, *Amphistichus argenteus*, and *Holconotus argenteus*. In the spring (April and May), *Hypsurus caryi*, the Orange-banded Perch or Bugara, is common. The Red-finned Perch is not often in the market.

The Silver Surf-fish (*Amph. argenteus*) was, during last Winter, sent in great numbers from Monterey, and many individuals approached the Alfione, or Thick-lipped Perch, in size and weight, reaching a length of fourteen to sixteen inches, and a weight of four or five pounds.

Professor Jordan does not believe *Hyperprosopon arcuatus* to be a valid species; so that all the large-eyed, up-turned mouth and short-bodied perch, are to be considered as one species, and the name Wall-eye will suit very well.

*Hystercarpus traski*, the only member of the family that inhabits fresh water, has been frequently sent to market during the summer, notwithstanding its small size. It occurs in streams at least as far south as San Luis Obispo.

#### FAM. SCIÆNIDÆ.

The family of sciænoids is not largely represented on the northern portion of our coast, but its members become more numerous from Point Concepcion southwards. Into the Bay of San Francisco come *Cynoscion nobilis*, the sea bass; *Genyonemus lineatus*, popularly called king-fish, and *Scirphus politus*, also called king-fish. The last is far from common, but the first two are well known and highly prized food fishes. The first attains a large size, examples of from forty to sixty pounds weight being frequently brought to San Francisco market in summer months.

The king-fish rarely exceeds ten inches in length, but makes up for its small size in its delicate flavor.

Below Point Concepcion occur *Corvina saturna*, *Roncador stearnsii*, *Umbrina xanti*, *Cynoscion parvipinnis*, and *Menticirrus undulatus*, making a total of eight species.

*Cynoscion parvipinnis*, Blue-fish, Corvina, also called Caravina, and Sea Bass—This species, originally described by Dr. W. O. Ayres, occurs at San Pedro and southward, and is not rare in winter, when it frequents the bays and is taken in seines and gill nets. It feeds chiefly on crustacea. Its flesh is esteemed, but will not keep long, reeembling in this respect the weak-fish—(*Otolithus regalis*)—of the Atlantic States. It reaches a length of two feet, and a weight of five pounds, (Jordan).

*Cynoscion nobilis* (*Atractoscion nobilis*), Sea Bass, White Sea Bass—Very abundant in spring and summer from San Francisco southward. It feeds on crustacea, anchovies, etc. The young are sold as sea trout, and are often considered by fishermen a distinct species. This is one of the most valued food fishes of the coast, having firm white flesh. Examples of from fifty to sixty pounds weight are not rare in our markets.

*Menticirrus undulatus*, Sucker Bass, also known as Bagre and Sucker—Abundant from Santa Barbara southward, on sandy shores, and taken in seines and gill nets. It feeds largely on crustacea, reaches a length of eighteen inches, and a weight of two pounds and a half, and is held in moderate esteem as food. (Jordan).

*Umbrina xanti*, Yellow-finned or Yellow-tailed Roncador—This

species is abundant from Santa Barbara southward, on sandy shores; feeds on crustacea, squid, etc., and spawns in July. It reaches about a foot in length and two pounds in weight. Many are taken in seines and gill nets. It is considered a food fish of good quality, and at San Pedro many are split and salted.

*Genyonemus lineatus*, King-fish, Little Bass, Little Roncador—This species ranges southward at least to San Pedro, but is most abundant northward, especially in summer, becoming scarce in winter. It lives between the shore and the kelp, and is taken with hook and line at the border of the kelp, as well as in great numbers in seines. Crustacea form its principal food. Many are dried by the Chinese. The flesh is rather soft.

*Roncador stearnsii*, Croaker, Roncador—Abundant from Santa Barbara southward, on sandy shores, in rather deeper water than *Umbrina xanti*, and taken chiefly in gill nets. It feeds mostly on crustacea, spawns in July, and reaches a length of two feet, and a weight of five or six pounds. It is considered a good food fish.

*Corvina saturna*, Black Roncador—This fish has the same range and occurs in similar situations with the preceding, but is less abundant, and smaller, not exceeding eighteen inches in length, and about three pounds in weight. It is less attractive in color than *Umbrina* and *Roncador*. This species may be recognized by its dark gray color, bluff snout, and short body.

*Scorpius politus*, King-fish, Queen-fish—Rare at San Francisco, but more abundant southward, along sandy shores. It is taken in seines, especially at Santa Barbara and Soquel. Although in flavor probably the best of the small *Sciænoids*, its small size—seldom more than eight inches—causes it to be but little valued.

#### FAM. PERCIDÆ—PERCH.

This family has been divided and subdivided into numerous groups, and it now appears likely a reunion may be established. The *Sparidæ*, which have the hinder end of the maxillary hidden behind the suborbital in the closed mouth, and are furnished either with cutting incisors in front of the jaws, or grinding molars at the side, seem at first very distinct, but they are linked by such forms as the *Pristipomatidæ* with the more typical *Percoids*. As only nine species are yet known upon our coast, it will be as well to consider them all as *Percidæ*.

*Girella nigricans*, Blue-fish—This appears to be the only sparoid fish found on the coast of Upper California. It occurs but rarely in the markets of San Francisco, where it is brought from the Bay of Monterey. Its proper range ends near Point Concepcion, northward of which those found are only stragglers, while southward it is abundant.

It may be recognized by its curious three pointed, or rather three lobed teeth. In form it is an elongated oval, and in color an almost uniform brackish olive. It is abundant about Santa Barbara, where it is usually taken in gill nets, and is an important food fish.

It is entirely herbivorous in its habits, and is very tenacious of life. Soon after death the flesh begins to soften. It reaches a length of about a foot, and a weight of four pounds.

*Scorpius californiensis*, Moon-fish—Exceedingly rare, though this species is at San Francisco, it becomes abundant south of Point Con-

ception, so much so that the great bulk of the fish taken by the Wilmington fishermen off Santa Catalina Island, for the supply of Los Angeles, consists, Professor Jordan informs me, of this fish. The few that have been taken in Monterey and even in Tomales bays must be regarded only as stragglers from the crowd. Its chief food is crustacea. It reaches about a foot in length and three pounds in weight, and ranks high as a pan fish.

In color it is gray, the ventral fins are covered with scales, the form is a regular oval and the mouth is small, with three lobed incisors.

*Serranus maculofasciatus*, Rock Bass—Abundant in bays from Point Concepcion southward, especially at San Diego, where it is taken in seines and also with hook and line from the wharves. It is not found in deep water nor about islands. It feeds chiefly on crustacea and squid; reaches a length of fifteen inches and a weight of from two to three pounds, and is considered an excellent food fish.

This species is prettily spotted all over with small round purple spots, and across the body, overlying the spots, run several irregular darker transverse bands.

*Serranus nebulifer*, Johnny Verde—The greenish tint of this species explains its common name, but the lower part of the head exhibits purple spots similar to those of the last species, to which, despite its more elevated dorsal, it is closely related. It ranges to Monterey, and is common in San Pedro and San Diego Bays. A large example reaches twenty inches in length, and a weight of about four pounds. It is considered a good food fish.

*Serranus clathratus*, Cabrilla, Rock Bass, Kelp Salmon—From Monterey southward, becoming more abundant towards the southern extremity of the State, and constituting one of the most important food fishes of the Santa Barbara Islands. It lives among rocks in not very deep water; feeds on crustacea and squid, and reaches about the same size as the last species. It is considered one of the better class of food fish, and is only occasionally split and salted.

*Stereolepis gigas*, Jew-fish, Black Sea Bass—The Farallones appear to be the northern limit of the range of this huge sea-perch, which becomes abundant southward, especially about the Santa Barbara Islands. It is said to be an excellent food fish, but from its great size, is not often taken. It is caught by still-fishing, not by trolling, but individuals are often taken by swallowing white-fish, etc., when the latter are on the hook. Small examples are sometimes brought to San Francisco market, and its occurrence within the Bay of San Francisco is on record. It reaches a weight of four to five hundred pounds.

#### FAM. AMMODYTIDÆ—SAND LANCES.

*Ammodytes personatus*, the sole member of this family recorded from this coast, is abundant upon sandy shores from Monterey northward. In Puget Sound it is exceedingly abundant, swimming about bays close to shore in immense schools. Sometimes it is found buried in sand between tide marks. It reaches a length of five or six inches and is seldom eaten.

The *Ammodytidæ* have no ventral fins; the gill membranes are continuous around the throat, and the vent is situated far back upon the body. In the Aleutian Islands this fish is called the Candle fish.

## FAM. SPHYRÆNIDÆ—BARRACUDAS.

This small family of highly carnivorous and swift swimming fishes contains the genus *Sphyræna* only, and is represented on this coast by *S. argentea*, the well known Barracuda of our markets. From San Francisco southward it is abundant in summer, when it probably comes near shore for the purpose of spawning. Its chief run is in July. In the winter it probably retires to deeper water. Professor Jordan states that it is taken chiefly by trolling at a distance of three or four miles from shore, except about the Santa Barbara Islands, where it is taken with hook and line. In autumn and winter the young are sometimes taken in seines. It is considered one of the best food fishes, and when salted and dried, sells at a higher price than Alaska codfish. It reaches a length of three or more feet, and a weight of twelve pounds. The Sphyrænidæ are covered with smooth scales, and have the ventrals placed far back.

## FAM. ATHERINIDÆ—FALSE SMELTS.

Three species of this family, which, though containing chiefly small fishes with feeble teeth, agrees with the last in having smooth scales, and in the abdominal position of the ventrals, are found upon this coast.

*Atherinopsis californiensis*, the Common Smelt, is taken in great numbers in all bays open to the ocean from San Francisco southward. It resides in positions sheltered by rocks, and is often caught by trolling with a small hook.

*Atherinops affinis*, the Little Smelt, prefers, according to Professor Jordan, more sheltered situations than the former for a residence. It is considered a pan fish of good quality, having firm but rather dry white flesh. Though smaller than *A. californiensis*, it reaches a foot in length. Many are dried by the Chinese.

*Leuresthes tenuis*—This occurs in large schools at San Diego, and reaches a length of five inches.

## FAM. MUGILIDÆ—MULLETS.

The Mullet, mentioned in the last report of the Fish Commissioners, proves to be really *Mugil mexicanus*. In San Diego Bay, Professor Jordan found it abundant. At San Pedro it made its appearance three years ago, and has since been tolerably common, and it is occasionally sent to our markets from Monterey. Professor Jordan believes that it is spreading northward along the coast. It feeds upon mud containing organic matter, reaches a length of about fifteen inches and is much esteemed as a pan fish.

In winter, it enters creeks and lagoons, where many are landlocked and destroyed by sea birds.

## FAM. SCOMBERESOCIDÆ—GAR-FISHES.

This group of fishes is represented on the southern part of our coast by four species. From all otherwise related families these may be known, by the union of the lower pharyngeal bones into a single bone (as in the *Labridæ*), and by the presence of a series of keeled scales along each side of the belly.

As in the Cyprinodonts, there is no adipose dorsal fin, and the dorsal and anal are placed far back upon the caudal part of the body.

*Belone exilis*—Needle-fish, Gar-fish. In summer, this species frequents bays and lagoons along the coast from Santa Barbara southward, for the purpose of spawning, but it is not common. It reaches a length of two and a half feet, and is esteemed as food.

*Exocoetus californicus*, Flying-fish, Volador—Professor Jordan has found this species abundant along the southern part of our coast, as far north as Santa Cruz. It is particularly common in Santa Barbara Channel, and about Santa Catalina Island. It goes in great schools. Respecting its habits, the following is quoted from the MS. of Professor Jordan:

"The Flying-fish flies for a quarter of a mile, not rising more than three or four feet above the surface. Its motive power is given by rapid movements of its powerful tail in the water, which movements are continued after the body is out of the water and the pectorals spread. When the tail is out of the water, the ventral fins are also spread out, and the motions of the pectorals cease. Its motion is then very swift, and in a straight line, which afterwards becomes a curve by the partial turning over of the body, one wing being placed partly against the wind. Motion is often renewed by putting the tail once more in the water, as the fish falls so as to touch it. It is to some extent able to shy off from a vessel. In the water its movements are very rapid. It reaches a length of fifteen inches and a weight of a pound and a half or more, and is considered excellent food. It spawns about the beginning of August, which is the cause of its visit to the coast. Large numbers are taken in seines and gill nets off Catalina Island. Nine-tenths of those seen in July were males."

#### FAM. SALMONIDÆ—SALMON AND TROUT.

The salmon and trout, once reported to be so numerous in species, are gradually becoming fewer as examination is made of the same species at different seasons of the year, in salt and fresh water, and at the various periods of its life.

The long list of anadromous salmon (*Oncorhynchus*) is now by the researches of Professor Jordan and Mr. Gilbert, reduced to six, which bear the provisional names of *nerka*, *gorbuscha*, *quinnat*, *kisutch*, *keta*, and *kennerlyi*.

These names are provisional because some, if not all, of the species not only occur upon the Pacific Coast, U. S. A., but extend northwards to Behring's Straits, and down the opposite coast of Kamtschatka. They are thus probably identical with some or other of the species previously described from the coast of Asia.

The various species of salmon and trout are subject to great variations in consequence of change of habit, as well as to others caused by age, sex, and season; and these changes have been the cause of the excessive multiplication of nominal species. Salmon, when in the sea, are of a silvery, steely, or bluish tint, darkest upon the back. When in the river, the silvery tint is lost and the flesh also becomes lighter. The young of all the species are cross-barred with darker tints which disappear with age. The form and proportions of the body are also, in the anadromous species, liable to change, as also those of the fins. Neither can comparative size be depended upon.

The *Salmo sebago* of the lakes of Maine is believed to be only a land-locked *Salmo salar* depauperated by the more confined habitat. The trout of a small brook never attain the size of those of a larger river.

The *quinnat* of this coast was prevented from returning to the ocean from the lakes San Andreas and Pilarcitos by the erection of the dams of the Spring Valley Water Company, and now those lakes are full of salmon which mature their eggs and milt when less than a pound in weight.

The characters which can be depended on to distinguish the species of salmon are as follows: To some extent, the form of the caudal fin and the arrangement of the spots upon the body, especially near the tail; the number of rays in the anal fin (*Oncorhynchus* has fourteen or more, *Salar* or *Salmo* about twelve); the size of the scales; the number and size of the gill rakers, or toothlike processes upon the bones which bear the gills; the number of branchiostegal rays; and the number of the pyloric cæca which are attached to the lower end of the stomach. The teeth are also to be regarded, but not implicitly, as they are liable to alterations with age. More attention has naturally been devoted to the study of this group than to that of any other, on account of its importance as a source of food.

Upon this coast, the salmon fishery upon the Columbia alone accounts for about a million and a half of salmon, weighing when taken at least twenty-five pounds each on an average. This is probably equal to twice the total weight of all other fisheries, salmon included, carried on upon the Pacific Coast of the United States, even with the Alaska cod fishery thrown in.

The life history of these fishes is thus invested with much interest, since, upon our knowledge of it, depends the success of any attempt that may be made to prevent, by judicious legislation, the threatened decrease of the species.

The season of the principal run differs according to the species, and it appears to be tolerably well established, by the reappearance of marked fish, that some individuals make good their retreat after spawning, and return again next year, although the greater portion die of the exhaustion consequent upon their ascent of the streams. This is the case more particularly with those which ascend highest, jumping falls, passing rapids, and braving the difficulties of a long journey without food.

*Oncorhynchus quinnat*, the Common Salmon—This is the salmon *par excellence* of the Pacific Coast, the victim of the canning industry, the Columbia River salmon, the taste of which is familiar to Briton, Australian, Frenchman, and Teuton. As the salmon business is fully discussed in the Report of the Fish Commissioners, no statistics need be given here. An interesting fact in its natural history is that, as with the shad, so with the *quinnat*, we know where some at least of the individuals spend their time while absent from our rivers. In this respect we are ahead of our Atlantic brethren, who, as yet, have not found out what *Salmo salar* or *Clupea sapidissima* do with themselves during their holidays. *Quinnat*, like *Clupea sapidissima*, and all the rest of our fashionable society, recreates in the Bay of Monterey, where he has this year furnished much amusement and some food.

It appears singular that few *quinnat* were caught during summer in the above named bay until this year, and this may appear to sug-

gest a change of habit in the fish; but, in view of the fact that new species of fish and crustacea are continually being brought in, and that this is known to be caused by the search of the fishermen in new fishing grounds, it is more probable that the *quinnat* have always been there, but that the fishers have failed to find them until lately. But it must not be supposed that all the *quinnat* go to the Bay of Monterey. Examples have been taken far southward of this point, and a few run up Ventura River every year.

South of this river our coast does not present any streams running freely into the sea, as the rivulets terminate in lagoons separated from the ocean by sand bars. The *quinnat* has evidently the most southern range of any of the species of *Oncorhynchus*, and possibly becomes less abundant northward, the most abundant salmon of Fraser River being *O. nerka*, the blue-back of the fishermen. Yet it is thought that the large "King-salmon" of Alaska is this species.

Notwithstanding the study that has been given to the habits of salmon, there are yet many points in their life history which are not cleared up. They are hatched in clear running brooks accessible from the ocean; they run down to the ocean when three or four inches long, and they return to the rivers to spawn. This much is certain, and it is certain also that the greater portion of the returning fish are large, and of the age of about four years. As smaller individuals, containing spawn, are sometimes taken, it is not unlikely that some run up the river and spawn once or twice before their final and fatal journey. However this may be, it appears that when full-grown, the salmon approach the coast, where, meeting with currents of fresh water from the rivers, they become irresistibly attracted, and follow them up until fairly within the stream. When at sea they feed freely and bite vigorously at a hook, but as soon as they are fairly within a river, they cease to feed and cannot be tempted to bite. The proof that they do not eat lies in the fact that the stomach of those taken in the river is always empty. Once in the river, they become impressed with an irresistible desire to penetrate further and further, and in obedience to this impulse, they mount rapids, spring up small cataracts, and flounder through shallows until, spent with exhaustion, battered and wounded by contact with rocks and other obstacles, and still further worn out by the process of spawning, the greater portion die. All spawn before they die, and as the strength of the individuals differs, they spawn at various points all along the river and its tributaries, but always in comparatively shallow and clean water. In spawning, they pair off; the female deposits her spawn upon the gravel, and the male pours out upon it the fertilizing milt. As the males mount up the river, a great change takes place in the form of the head. The jaws commence to enlarge and to curve, the upper forming a hook directed downwards, the lower a similar hook directed upwards. Coincident with the growth of the jaws, is that of the group of teeth upon their lips, which become relatively immense. The result is a "dog salmon" with a physiognomy utterly unlike the straight-jawed, neat looking individuals just arrived from the sea, and it is no wonder that such old males have been described as distinct species. The males also develop a more or less conspicuous hump upon the shoulder, but this is not very evident in the species we are now considering.

The females do not, at least as a rule, develop the hooked jaw, although it is reported that some individuals with hooked jaws

have been found to contain ova. Dead salmon are often found in the shallows of the upper courses of the rivers, having died before they could reach deeper water.

Some adventurous individuals follow the Columbia into the Territory of Montana before they succumb.

The color of the flesh of a salmon does not indicate its species, since the same individual which had bright red flesh when in the ocean, and at the commencement of its run, will become nearly white at or after spawning. It is clear from what has been said that the flesh of the "kelts," as the salmon after spawning are called in England, can scarcely be fit for consumption by human beings. Covered with wounds upon which fungus spores find a suitable nidus, many look sufficiently repulsive. It is probable that the stories of so called "poisonous" fish and other marine animals arise entirely from the injudicious eating of such creatures when exhausted with spawning, or when afflicted with some disease, the outward symptoms of which we do not recognize.

In the smaller rivers of the coast the run of salmon takes place in the autumn, thus, in Eel River, it commences when the first rains have caused the waters to rise. Thus the canning season upon the Coquille, Eel, and other small rivers, commences after that of the Columbia River is over. Some *quinnat* run up the Columbia in the autumn, and it is to this fact that we owe the preservation of the species, in spite of the immense numbers taken. The fishing is carried on during the spring run only, from April to July, during which season some 1,500 boats are perpetually engaged in it, so that from the bar up to off Mount Ranier there is an almost continuous web of nets, effectually preventing the ascent of by far the greater portion of the fish. Professor Jordan is, however, of opinion that the autumn run is sufficient to counterbalance the destruction. In Klamath, Fraser, Sacramento, and Rogue Rivers there is also a spring run. An ordinary full grown *quinnat* weighs about twenty-five pounds, but individuals attain a much greater size, reaching as much as sixty pounds or even seventy. Those found in the Sacramento are, as a rule, smaller than those of the Columbia, not averaging more than eighteen pounds. In Puget Sound the *quinnat* are also smaller and less fat than in the Columbia.

The *quinnat* has from fifteen to eighteen branchiostegals, or small bones supporting the gill membranes; and has the body, dorsal, and caudal fins spotted with round spots. On the approach of the spawning season it becomes darker and sometimes, but not always, acquires a reddish tinge. The scales become covered with a coating of mucus so that the fish cannot readily be scaled. The pyloric cœca are very numerous, varying from a hundred and fifty to two hundred, so that it may be readily known by an examination of the stomach from *O. nerka*, which has about seventy-five very small cœca, and *O. keta*, which has from sixty to eighty large and thick ones. In this character *O. kisutch* and *O. gorbuscha* are near *quinnat*, but the branchiostegal rays of these species, like those of *nerka* and *keta*, are only thirteen or fourteen in number. *O. keta* has fewer spots than *quinnat*; the caudal has a few spots on its upper rays, and the dorsal a few on its first rays. *O. nerka* is *immaculate* as is *O. kisutch*.

*Oncorhynchus keta*, Silverside Salmon, Cohoe Salmon—The *tsuppitch* of Dr. Richardson has at length been identified by Professor Jordan as the *keta* of Walbaum. It turns out to be a salmon of the genus



*oncorhynchus*, and not a trout as heretofore supposed. Its previous identification with the so called "Black Trout" of Lake Tahoe is thus found to have been an error. There is but one species of trout yet known from that lake, the presence or absence of teeth upon the hyoid bone being the result of accident or individual peculiarity. The real *tsuppitch* or *keta* reaches a length of fifteen to eighteen inches, and a weight of four or five pounds. When in the ocean, it feeds on crustacea, herring, etc. This salmon is said to be very superior in Quinault River, where it is abundant and is salted by the Indians, as it is also at Neah Bay, at which point it was formerly canned. Professor Jordan saw it at Seattle, and speaks of it as abundant in Puget Sound and at Cape Flattery, as well as for some distance north and south from thence. As a food fish it ranks with the young of the *quinnat*. It runs up Eel River, California, and has been taken in the Sacramento.

*Oncorhynchus nerka*, Blueback; also called by fishermen, Rascal, Sukkeye, Redfish, Dog Salmon—This is a much smaller salmon than the *quinnat*, and apparently has its headquarters farther north. In the Columbia it is common, but less so than the *quinnat*, while in Fraser River and the streams of British Columbia generally it is the commonest salmon. It is often canned upon the Columbia, but without acknowledgment, as four of them are reckoned and paid for as one *quinnat*, although of course four *nerka* exceed in weight one of the latter.

In Puget Sound it is abundant, and ranges northward as far as the Aleutian Islands. It reaches eight to twelve pounds in weight. This species runs up the river principally in the Spring.

*Oncorhynchus gorbuscha*, Humpback—This species may readily be distinguished from the *quinnat* by the smaller size of the scales, and also, at least in the Sacramento, which it ascends in tolerable numbers in October, by the greatly developed hump formed by the dorsal outline immediately behind the head. *O. nerka* also becomes humpbacked, but not to so great an extent as the present species. The males, in the spawning season, present in perfection the character upon which the genus *Oncorhynchus* was founded, viz.: the hooked jaws, which give the fish a repulsive appearance. It does not appear to be a common species, except in Puget Sound, and does not exceed five to eight pounds in weight.

*Oncorhynchus kisutch*, Dog Salmon—This, the true Dog Salmon, occurs in Puget Sound, Fraser River, etc. In most characters, except the scales, it agrees with the last species; but the scales are larger, and the aspect of the fish different. The males, when they enter the rivers in the fall, have reddish transverse bands alternating with greenish, and become blotched with these colors as they ascend. The females are bright silvery on entering the rivers.

*Oncorhynchus kennerlyi*, the Red Fish—This species appears to be, for the most part, an inhabitant of lakes that have no outlet, and is thus debarred from taking a trip to the ocean. Living in the lakes as ordinary salmon do in the sea, it runs up the rivers that flow into them, and deposits its ova in their clear water, just as other salmon run up the rivers flowing into the sea.

After spawning, other salmon become redder in their external coloration, and are "redfish," but this is the "Redfish" *par excellence* of the Indians, the valued fish of the lakes, to procure which they take long journeys.

The Redfish attains a weight of from four to five pounds.

*Salmo henshawi*, the Silver Trout—Two species of trout, *S. tsuppitch* and *S. henshawi*, commonly called the Black and the Silver Trout, were once supposed to inhabit Lake Tahoe and other lakes, but *S. tsuppitch* proves to be a salmon instead of a trout, leaving *Salmo henshawi* in sole possession as at once the Silver and the Black Trout of Lake Tahoe. Again and again has the writer examined the so called Black Trout of Lake Tahoe, in the endeavor to find any difference between it and the Silver Trout, and has failed. Head, teeth, gill-covers, fins, tail, all external characters of form, were alike. Yet the dealers make out two species; and in the Museum of the Academy of Natural Science we have what purport to be specimens of both, presented by the Acclimatization Society. These also I examined with the same result as with the fresh specimens. *Salmo tsuppitch*, the Black Trout, was said to be without teeth upon the hyoid bone. Occasionally a large trout without these teeth would occur, but invariably it was a particularly silvery and unspotted individual. If there were two species, it became evident that it was the Silver Trout that was without these teeth; yet other silvery trout had them. At last Professor Jordan claimed that he had found the real *tsuppitch* in the Columbia, and that he believed all the trout in Lake Tahoe were *henshawi*. It is well known that the delicate hyoid teeth become worn off by age or accident, in many cases. The Black Trout of the dealers must, therefore, be a myth, so far as species is concerned; yet, as those called "black" usually arrive here at a different season of the year than those called "silver" (which are often as dark as the black), it is not unlikely that there may be some peculiarity in the flesh, especially as the dealers profess to find a difference in firmness between them.

*S. henshawi* is sparsely covered with rather large dark round spots.

It reaches a weight of two or three pounds. Large quantities are sent from Wadsworth, on the Central Pacific Railroad, to the markets of San Francisco.

It is not confined to the lake it is named after, but occurs also in other mountain lakes, and in the Sacramento River, but it has not yet been traced to salt water.

*Salmo irideus*, the Brook Trout—This is the almost universally diffused brook trout of the streams of this State, and is, when adult, singularly handsome, glowing with peculiarly shaped spots or short bars of metallic golden green.

It has been generally catalogued as an exclusively fresh water fish, but it appears to share to some extent the anadromous habits of *Salmo salar*—as "sea trout"—possessing all the characters of *Salmo irideus* except the color, which is light, almost uniform, silvery, are frequently brought to the markets of San Francisco during the winter months, and there is little or no doubt that these are *iridea* which have left the streams for a more or less prolonged visit to salt water.

The fact is that all trout although for the most part inhabitants of fresh water, take occasional trips to the sea when the waters they inhabit are favorably situated for the purpose. *S. irideus* is usually of small size, not exceeding a foot in length, but under favorable circumstances reaches eighteen inches. In the Columbia it is rare, but Professor Jordan saw a few from a stream above Astoria.

The fish is seldom brought into the markets of San Francisco from fresh water.

*Salmo mykiss*, Hard-head, and Black Salmon—This is an exceedingly large trout, equal or superior in size to *Onc. nerka*, since it reaches a weight of from fourteen to eighteen pounds. It inhabits the mouths of large rivers, such as the Columbia, Fraser, Skeena, etc., and is occasionally found in Puget Sound. It appears to spawn in spring, somewhat earlier than the salmon, and occurs upon the coast at the same time with the latter. It is believed to be migratory. In some regions it is esteemed as a food fish, but in the Columbia the flesh is very white, and it is considered valueless. The body is less deep than that of a salmon, and the tail much heavier.

*Salmo clarki*, Oregon Trout, Salmon Trout—This species is very abundant in all lakes and rivers north Mount Shasta, but is not found south of that locality. It is abundant in salt water in Puget Sound, where it is taken in seines in great numbers. It reaches a weight of from two to three pounds, and is reckoned an excellent food fish.

*Salvelinus malma*, Dolly Varden Trout—The Charr is abundant in the lakes and streams of the Cascade Range, from Central Oregon northward, and is also very common in the salt waters of Puget Sound, where many are taken in seines. Specimens obtained at Seattle and in the markets at Victoria reached a weight of eleven pounds, but in the mountain lakes and streams it does not exceed three pounds. Many are brought in by the Indians at the places before mentioned. It feeds freely on sticklebacks, herrings, etc., and is an excellent food fish.

The Dolly Varden trout of the Upper Sacramento, formerly known as *Salvelinus bairdi*, proves to be identical with this. Mr. Smith, who is stationed at the fish-hatching establishment upon the McCloud River, has examined many specimens, and finds that the characters relied upon to distinguish them utterly fail. Teeth are present upon the hyoid bone, in most examples from the McCloud, as in the typical *spectabilis*. The supposed absence of these teeth was the chief character upon which *bairdi* was based.

*Hypomesus olidus*, Surf Smelt—Professor Jordan did not meet with this fish south of Monterey, and states that it is very abundant in Puget Sound, where it spawns in the surf in the spring. It reaches nearly a foot in length, is very fat, and is held in high esteem as a pan fish. In the markets of San Francisco it is tolerably common, but seldom exceeds eight inches in length.

*Osmerus pacificus*, Eulachon, Candle-fish—The Eulachon has not yet been recorded from the coast of California, but is abundant from Oregon northward, ascending the rivers in enormous numbers, but for no great distance. In the Columbia, as well as in Fraser and Nass Rivers, it is especially abundant. In Fraser River the run is in May. On Nass River is a factory for making Eulachon oil, which is used as a substitute for cod-liver oil. When fresh it is one of the finest of pan fish. Many are pickled and shipped to San Francisco, where they are held in the highest esteem. Its use as Columbia River Sardines has been previously mentioned. The largest reaches a length of about ten inches.

*Osmerus thaleichthys*, Smelt, Small Silver-smelt—Tolerably common from Monterey Bay northward, but not running in such num-

bers as the two preceding smelts. It reaches six to eight inches long, and from its smaller size and softer flesh is less valued than the eulachon or surf-smelt. It rarely comes to San Francisco market in very good condition, and hence is less salable than the spurious smelts, of the family *Atherinidæ*.

*Osmerus attenuatus*, Slender Smelt—About equal in size to the preceding, but of a more attenuated form, with a straight lower jaw instead of a curved one, and a different upper surface of head. Not very common in the markets of San Francisco. Range not made out.

*Albula vulpes*, Lady-fish—This world-wide species, which, though by some classed with the herrings, differs from them in the rounded form of the abdomen, which in the latter is compressed and sharp-edged, and in the numerous pavement-like teeth of its mouth, is apparently resident at San Diego, where it is rather common, and is sold as a food fish along with the mullet. Its bright silvery coloration renders it salable, but it is not highly valued. It spawns late in the autumn, and reaches a length of about a foot.

#### FAM. CLUPEIDÆ—HERRINGS.

Including the Anchovies, this family has only five representatives upon the coast of California, only three of which reach San Francisco.

*Clupea sagax*, Sardine—This species occurs more or less abundantly in our markets throughout by far the greater portion of the year. In April and May those brought in are chiefly young, and it is commonest about July and August. The sardine may be distinguished from the herring by its thicker and more elongated body, somewhat longer head, and striated gill-cover, as well as by the total absence of teeth; by the even jaws (in the herring the lower jaw projects); by the narrow pointed form of the area included between the ridges on the top of the head, and by the row of spots on the sides. At San Diego it is even more abundant than at San Francisco, and is taken from the wharves with hook and line.

This species is very close to, if not identical with the *Clupea pilchardus* of Europe, the young of which are the sardines put up in oil that are so highly prized. It appears strange that no attempt in this direction has been made in California.

*Clupea mirabilis*, Herring—The herring of this coast is, on the whole, slightly smaller than that of the Atlantic, and since it is not salted or dried to any great extent, it does not figure so largely as an article of food. This, however, is not due to any scarcity of the fish, which occurs in shoals along the coast of California in the winter season, and is still more abundant northward. During some of the winter months, the bulk of the fish brought into San Francisco market consists of these species. In September the first of the season are taken. In November it becomes abundant, and in March or April falls off and disappears. Some have been cured in Humboldt Bay, but are said to be very poor; indeed, it is stated that the herring found along the Pacific Coast of the United States are far inferior to those taken between Puget Sound and Oonashka. At the latter place the Alaska Fish Company put up a small quantity, and the Cutting Packing Company salt some at Sitka. The Indians press the whole fish for oil, and the spawn is kept to form part of their winter stock of food. At Puget Sound many

barrels are sometimes taken at one haul of the seine. It reaches about a foot in length, and spawns in January at San Diego, but much later on the northern part of our coast. It is nowhere much valued.

*Clupea (alosa), sapidissima*, Shad—This species has prospered since its introduction into the Sacramento, and is now brought to market pretty regularly, although it still bears a high price. As in the Atlantic States, it descends to the sea at intervals, and the locality chosen by a large proportion of the species is the Bay of Monterey. Others scatter to a greater distance, as Professor Jordan took two examples on the Columbia River; and it has also been taken as far south as Wilmington. The largest shad I have yet heard of on this coast was sold in the spring of this year, by Messrs. Spence & Johnson, of the California Market. This individual measured twenty-six inches in length, nine and a half in width, and weighed eight pounds and a half. One of about the same dimensions, but not quite so heavy, was sold by the same dealers last year.

*Stolephorus ringens*, Anchovy—This is one of the most abundant of the finny tribe along the coast of California, and although not taken largely by the fishermen, is of great indirect service to man, since it forms a large part of the diet of other fishes. Even the tomcod, itself the prey of almost every fish used for food, devours its share of *S. ringens*. It frequents quiet bays. Two other species of anchovy occur in the southern part of California, viz.: *S. compressus* and *S. delicatissimus*. Both of these species differ widely in color from *S. ringens*, being yellowish, with a silvery streak along the flanks, instead of deep bluish.

In *S. compressus* the oval fin is much longer than in either of the other species. *S. compressus* reaches a length of about five inches, and is very abundant in the Bays of San Pedro and San Diego. It is not eaten, as its flesh is very dry.

*S. ringens* is chiefly used for bait, especially by the Chinese, who salt it for that purpose. In San Francisco market it is occasionally pickled with spices. It reaches a length of six inches.

*S. delicatissimus* is a very small species.

#### ORDER APODES, FISHES WITHOUT VENTRAL FINS.

This order, which includes numerous fishes having an extremely elongated form, with numerous vertebræ, very small branchial apertures, no ventral fins, and fin rays of simple structure, is but poorly represented on this coast, since only the specimens occur within the limits of California, and one or two others farther north. All of these are marine.

*Muraena mordax*, Conger Eel, Congaree—The Conger is abundant about Santa Catalina Island, and at San Diego, where it lives among rocks near tide marks, and may sometimes be taken on land. It is very pugnacious, striking like a snake. The flesh is fat and palatable like that of the fresh water eel, and as it reaches a length of five feet, and a weight of fifteen to twenty pounds, it is esteemed as food, although the skin is reputed to be poisonous.

## ORDER CHONDROSTEI—STURGEONS.

The four species catalogued from this coast, have dwindled to two upon further examination. *Acipenser brachyrhynchus*, the large short-nosed sturgeon, of the Bay of San Francisco, proves to be identical with *A. transmontanus* of the Columbia River; while the *A. acutirostris* or sharp-nosed sturgeon of Ayres is the young of the same species.

The only other species, although no sharper-nosed than the preceding, must bear Ayres' name of *medirostris*, while the *A. acutirostris* of Gunther (Cat. Fish. Brit. Mus. VIII. 344), and the *A. agassizii* of Dumeril, are but the young of this species. Both have the snout acutely pointed when young, and becoming more bluff with age.

*Acipenser transmontanus*, White or Common Sturgeon—This sturgeon is common in all bays and large rivers from San Francisco northwards, and is taken in great numbers on the Sacramento, Columbia, and Fraser Rivers. It feeds to a considerable extent on crustacea, and Fraser River gorges itself with the eulachon.

It runs up the rivers in the spring with the salmon. It reaches eight, ten, and even twelve feet in length, and a weight of six hundred pounds, but most of those brought to market are much smaller, from twenty-five to fifty pounds. The flesh is largely consumed in this city, and is very cheap. Much of it is smoked. The eggs are used as caviare, and are much esteemed by Germans and other Europeans.

*Acipenser medirostris*, Green Sturgeon—The distribution and habits of this species are the same as those of the preceding, but it is much less abundant, and though a large species, is probably inferior in size. It is not eaten, as it has the reputation of being poisonous. The smaller number of plates in the lateral line, the greater striation of all the plates, and the different position of the anal fin, are characters by which it is easily distinguished, to say nothing of the green color of the flesh, which is probably the cause of its bad reputation and certainly prevents its sale as "sea bass." The flesh is in reality as good as that of the white sturgeon.

## CLASS—ELASMOBRANCHII.

The *Elasmobranchii*, or Sharks and Rays, are fishes of a generalized type, differing widely on the one hand from the true bony fishes, and on the other from the far less organized lampreys and myxines. In the days when it was believed possible to arrange all the forms of life in a straight line, ascending or descending, naturalists were puzzled to know where to place these creatures. In some part of their structure they seem to be as far above true fishes as in others they are below it. The brain is in many respects superior to that of a typical fish, such as a perch or salmon, and the arrangements for securing the reproduction of the species approach in complexity those of the mammalia. On the other hand, the skeleton is cartilaginous and imperfectly developed, and by far the greater number are without a gill covering. The development of the reproductive organs varies greatly in the different families and genera of this class; some are oviparous, but produce few and large eggs, while in others the young are hatched within the body of the mother, and in some species of sharks a rudimentary placenta is formed, the vascular wall of the

umbilical sac becoming plaited, and interdigitating with similar folds of the walls of the uterus.

The great majority of the Teleostei, or true fishes, deposit an immense number of ova; but some, as the Embiotocidæ, or viviparous perch of this coast, are ovoviviparous, that is, the young are hatched within the ovary. In these cases, however, there is no trace of a placenta developed, as in the Elasmobranchs. But there is another and greater difference. In true fishes there is no union of the sexes. The milt of the male is squeezed out over the ova of the female—the two sexes, in some cases at least, assisting each other in the operation by rubbing their bodies together. But in the Sharks and Rays, fertilization is secured in the same manner as in all vertebrates above fishes, as well as in insects, crustacea, spiders, etc., namely, by the direct introduction of the male element into the female reproductive organs. In this respect the Teleostei, however specialized in other matters, took a step downwards, while the Elasmobranchs foreshadow, in their oviparous forms, the higher oviparous vertebrates, and in their viviparous forms the mammalia. While in the Teleostei the two sexes are usually much alike, and are distinguished externally only by slight differences in the form of the abdomen, or in the color (especially at the breeding season), the males of the Elasmobranchs may be readily distinguished by the pair of large organs known as “claspers,” which are really intromittent organs.

The skin of the members of this class is more or less studded with calcified papillæ, forming, when the papillæ are numerous and thickly set, what is known as shagreen; and the entire skeleton is cartilaginous.

This class is divided into two orders, the first of which includes only the *Chimæra* and its allies, which are characterized by the coalescence with the skull of the cartilage forming the upper jaw and palate, and by the presence of a single gill-opening only, and the *Plagiostomi*, or Sharks and Rays, in which the jaws are distinct from the skull, and there are from five to seven gill-openings. The pouches within these branchial slits are narrow, and divided from each other by a membrane, but the respiratory processes do not extend to their edges, except in *Chimæra* and its allies.

The Sharks and Rays, the two sub-orders of the *Plagiostomi*, are distinguished from each other chiefly by the more or less cylindrical form and lateral gill-openings of the former, and the depressed body and ventrally situated gill-openings of the latter. But the two orders approach closely by such forms as the depressed monkfish and the sawfish (*Pristiophorus*), with lateral gill-openings, and the scarcely more depressed sawfish (*Pristis*), with gill-openings on the under surface.

#### ORDER HOLOCEPHALI—CHIMÆRAS.

*Chimæra collici*, Rat-tail, Rat-fish—This species, the Pacific representative of the *Chimæra monstrosa* of the Atlantic, is by no means rare on all parts of the North American coast north of Point Concepcion, and is occasionally, on account of its bizarre appearance, brought into the market of San Francisco as a curiosity. In museums it is one of the most ordinarily occurring species, for every novice in ichthyology who procures one, believes that such thing was never seen before, and forwards it accordingly.

The two sexes of the chimæra differ widely in appearance. The female is larger and stouter than the male, and has less singularity of form, but the smaller male has upon the snout a curious cartilaginous organ, armed with recurved teeth on its button-like extremity. This projection can be used on occasion as a weapon of defense, but its normal use is that of a prehensile organ, subservient to the purpose of reproduction. The claspers of the male are of complex structure.

While performing the reproductive act, the shorter male holds the female lightly grasped by the pectoral fin, by means of the hooked projection upon its forehead.

This fish frequents rather deep bays, feeds on fishes and marine invertebrates, and takes the hook readily. It spawns in July, and its egg-cases are long and slender, and unprovided with tentacles. The liver is extremely large and fat, but the fish, which does not exceed twenty to twenty-four inches in length, with a weight of from six to eight pounds, is too small to allow of its profitable pursuit.

#### SUB-ORDER BATIDÆ—RAYS AND SKATES.

In the typical rays, *Raidæ Dasybatidæ*, the trunk is surrounded by the immensely developed pectoral fins, so that it forms a broad, flat disk, from which protrudes posteriorly a more or less long and slender tail. Some of the genera, however, approach the sharks, having a thick tail, and much of the body free from the pectorals. The gill openings are five in number, and are always on the lower surface of the body. Spiracles (breathing holes), are always present; there is no anal fin, and the dorsal fins, if present, are quite small and placed upon the tail. Fourteen species are now known to inhabit our coast, and all but three are peculiar to the west coast of North America. Previous to the visit of Professor Jordan, only seven were known to occur.

*Myliobatis californicus*, Stingaree, Sting Ray, Eagle Ray—This species is abundant along our coast at least as far north as Tomales Bay; and along the northern portion of its range is the only sting ray known. As the pectoral fins are not continued around the head, the sides of which are free, *Myliobatis* is not classed with the *Dasybatidæ*.

The Eagle Ray is especially abundant on sandy shores, and is very destructive to oysters, for the mastication of which, the broad flat surface presented by its hexagonal pavement like teeth is peculiarly fitted. It also devours crustacea and fishes, and reaches a weight of seventy-five pounds. It is not eaten by whites, but is occasionally dried by the Chinese.

Probably the same as *Myliobatis aquila* of the Mediterranean, Atlantic, and Australian Coasts.

*Manta birostris*, Sea Vampire—This gigantic species, which reaches fifteen to twenty feet in width, is said to occur on the extreme southern part of our coast. The mouth is wide, at the anterior extremity of the body, and contains teeth only in the lower jaw. These are small but numerous, in about a hundred longitudinal rows. This species is also called the Devil Fish, and has been said to carry down men beneath its outstretched pectorals. It is best known from the Atlantic, and is common in the Gulf of Mexico.



## FAM. DASYBATIDÆ—STING RAYS.

Like the Raiidæ this family has the pectoral fins continued around the front of the head and confluent at the extremity of the snout, but unlike them the tail is armed with a strong serrated spine capable of inflicting considerable damage.

Three species are known to occur on our coast, one of which, *Urolophus halleri*, Round Sting Ray, is abundant in every bay and lagoon and along sandy shores south of Point Conception, especially in San Diego Bay. Although the smallest of the species, reaching a length of eighteen inches only, it is the most dangerous, having great muscular power in its tail and striking quickly and accurately. It is not eaten though often taken in nets. An example thus taken was seen by Professor Jordan to strike its "sting" quite through the body of another one.

*Dasybatis dipteryurus* is rather abundant in San Diego Bay, and, in summer, many were seen of from two to two and a half feet in length, without the tail.

*Pteroplatea marmorata*, is far broader than it is long, reaching two and a half feet in width and two feet in length. It is common on bays and on sandy shores from Santa Barbara southwards. The large individuals taken at San Pedro are sent to Los Angeles, where they are eaten by the French residents. It is the only ray eaten there.

## FAM. RAIIDÆ—RAYS, SKATES.

Five species of this family are now known to be found upon our coast, four of them discovered and described this year by Messrs. Jordan and Gilbert.

*Zapteryx exasperatus*, abundant in San Diego Bay in winter, is too small for use as food; and *Raia stellulata*, which in winter and spring is very abundant in Monterey Bay, is not sent to market on account of its very rough skin and dark brown color, which render it less salable than the other rays.

Large numbers of both adult and young are taken in gill nets. It reaches two to two and a half feet in length.

*Raia rhina* ranges from Monterey to Vancouver, is often taken with hook and line from the wharf at Seattle, and is brought to San Francisco market in company with the other rays. Elsewhere it is seldom eaten, and is nowhere much valued. It reaches a length of two and a half to three feet.

*Raia binoculata*, is on the whole the most abundant species of ray in the markets of San Francisco, and is common along the coast from thence to Monterey. Those brought to market are mostly caught in the immediate vicinity. It reaches a length of two to two and a half feet. The French are the chief consumers of this fish, and eat it in the form of *Raie avec bœuf noir*.

*Raia cooperi*—This is the giant of its tribe, reaching a length of from five to six feet, and a weight of sixty pounds or more. Those sent to San Francisco market are usually much smaller, but examples three to four feet long may be seen there. From the preceding species it may be known at sight by the white spots upon its upper surface. It is abundant all along the coast from Monterey to Alaska, especially in Puget Sound, frequenting bays and sandy shores, and feeding on crustacea and fishes. It is taken both

in nets and with hooks. Its egg cases, deposited in July, are about a foot in length, and squarish with short tentacles at the angles. It is seldom eaten except at San Francisco, and yields but little oil.

#### FAM. TORPEDINIDÆ TORPEDOES.

*Torpedo californica* is not often taken in the Bay of San Francisco, but is tolerably common in the Bays of Tomales and Monterey. The fishermen in the latter bay do not appear to have seen any very large examples, but in the spring of this year one was brought to this city from Tomales Bay of the respectable length of three feet and half an inch, and measuring two feet across the disk. The width across the ventrals was thirteen inches, the eyes were three inches apart, and the spiracles an inch in length. The Italian fishermen call it *Tremulo*. When fresh it is of a leaden color above, with darker spots, and white below.

#### FAM. RHINOBATIDÆ.

*Rhinobatus productus*, Shovel-nose Shark, Guitar—The name guitar refers to the form of this fish, intermediate between that of a ray and a shark, having the thick tail of the latter, and the expanded pectoral fins of the former. It is tolerably common in the Bay of San Francisco and abundant in those of San Pedro and San Diego, residing on muddy and sandy bottoms, and bringing forth its young in August. It reaches a length of two feet or more. The tail is eaten by the Chinese and Mexicans, but is not valued. Otherwise it is only used as a bait for lobsters (*Panulirus*).

*Rhinobatus triseriatus*, Guitar—This species is much more ray-like in its form than the preceding, the disk formed by the pectoral fins predominating entirely over the rest of the body, the hinder portion differs only from that of a skate by its somewhat greater thickness. But the true skates or rays (*Raidæ*), are oviparous, while the present species, like the preceding and all the *Rhinobatidæ*, is viviparous. Three or four young are produced in each ovarial sac, and are brought forth in August. It reaches a length of two feet, and a weight of four pounds. It is not used.

#### SUB-ORDER SQUALI—SHARKS.

Until Professor Jordan commenced his researches this year, only nine species of sharks were on record from this coast, of which three only, viz., *Triacis semifasciatus*, *Notorhynchus maculatus*, and *Heterodontus francisi*, were peculiar to it. The list is now increased to twenty, but all the newly recorded species are well known forms inhabiting the opposite coast of the Pacific, or more commonly the Atlantic, and Mediterranean also, so that it appears probable that all the species found in the Atlantic will ultimately be found here.

None of the sharks are used as food by the white inhabitants of this coast, but oil is expressed from the livers of some, and "sharks fins" are sold to the Chinese. In Europe some of the smaller sharks or dog-fishes are eaten.

Some of the sharks have spiracles, or breathing holes, but others are without them; the dorsal fins are large, usually two in number, and placed upon the body, and an anal fin is usually present. In

some of the species the eye is protected, like that of birds, by a nictitating membrane, or interior eyelid.

*Squatina angelus*, Angel-fish, Angelo, Monk-fish—This curious species is in many respects intermediate between the sharks and the rays, while it differs from both in the terminal position of the mouth. It is tolerably common in Tomales, San Francisco, and Monterey Bays, and thence southward. It reaches a length of five feet and a weight of seventy-five pounds, and ranges throughout the Pacific and Atlantic Oceans, as well as in the Mediterranean. The monk-fish has no anal fin, the pectorals are expanded horizontally, ray fashion, and the dorsals are situated upon the tail portion of the body.

*Heterodontus francisi*, Leopard Shark—This shark is found at least as far north as Monterey Bay, and is abundant at San Diego and San Pedro Bays. It spawns in winter, and its egg-cases are large, cylindrical, and a spirally twisted fringe around them. It reaches two and a half feet in length.

This species extends along the coast of Mexico, but is apparently distinct from the Australian species. The family to which it belongs is remarkable for its broad rolls, formed by the oblique series of large lateral teeth in the jaws.

*Notorhynchus maculatus*—This shark has seven gill openings, has been found at several points from Monterey northward to Puget Sound. The teeth of the lower jaw are set with numerous cusps upon their exterior edges. It attains a length of seven feet or more. Professor Jordan has lately obtained of a species of *Hexanchus* having six gill openings on each side. This he has named *H. corinus*. These species have one dorsal only; and the eye is without a nictitating membrane.

*Alopias vulpes*, Fox Shark, Thresher—This species does not appear to be common upon this coast, but undoubtedly occurs. It is reported by Ayres from Tomales Bay; and a tail, which in this fish is nearly equal in length to the rest of the body, and is thus enough for identification, was found by Professor Jordan at Monterey. It is occasionally taken in seines at Soquel.

This species is found also in the Mediterranean and the Atlantic. The story that it attacks the whale appears to lack proof, as it is difficult to understand how it could inflict much mischief on so large an animal by striking it with its tail as is reported. It reaches a length of thirteen feet.

*Catulus ventricosus*, Ground Shark, Puffer Shark—This species does not appear to occur north of Monterey Bay, but is tolerably abundant at Santa Barbara in the winter, where it lives among the kelp, and is often caught in the lobster-pots set to catch the craw-fish or spiny lobster (*Panulirus interruptus*), which is sent from Santa Barbara to San Francisco in great numbers. The pots are baited with salted fish of which the puffer appears to be very fond. None are seen in summer. This shark has acquired its vernacular name from its habit of inflating its stomach with air, after the fashion of a globe fish (*Diodon*. *Tetrodon*), when it is made prisoner. It reaches two and a half feet in length and is of no value to man. In February the eggs are ready for extrusion, and this may account for its presence near shore. The egg cases are flat, oblong, and quadrangular, with very long tentacles at the angles.

*Cetorhinus maximus*, the Basking Shark—This is one of those widely spread forms that inhabit both the Pacific and the Atlantic;

occurring alike off the coasts of Ireland and California. It is one of the giants of the finny tribe, attaining a length of more than thirty feet, but, spite of its size, is one of the least formidable of sharks. Its teeth are very small; showing that, like the giant cetaceans, it is not adapted to prey upon large animals. Its presence on this coast was not known to naturalists until Professor Jordan noted its presence in Monterey Bay. The first example measured was thirty-one feet in length. Since then, others have been brought or cast ashore.

The name of Basking Shark has been given to this fish on account of its lazy habit of resting upon the surface of the water, with its dorsal fin exposed.

It is occasionally harpooned in Monterey Bay, and now and then becomes entangled in the gill nets. The livers are utilized for oil.

*Sphyrna zygaena*, Hammer-head Shark—This shark appears to be tolerably abundant in Lower California, since several examples were obtained there by W. I. Fisher in 1876 and 1877, one of them about fourteen feet long. An example, taken at San Pedro, was sent to the Smithsonian Institute by Dr. Cooper. None of the finny inhabitants of the seas can show a more singularly shaped anterior extremity than this species, which has its eyes placed at the end of the transverse prolongations of the head, each of which is as broad as it is long. The species occurs in all tropical and sub-tropical seas.

*Mustelus hinmulus*, the Dog Shark, and *Rhinotriakis henlei*, also called the Dog Shark, are usually about two feet and a half long, but occasionally more, and are used only for bait. The former is known to feed chiefly on crustacea and small fish. Neither are on record north of San Francisco. Both are Atlantic species.

*Triakis semifasciatus*, Leopard Shark, Cat Shark—This species is abundant in Humboldt Bay, and thence southward, and is very common everywhere, frequenting sandy shores and entering lagoons in summer to spawn. It attains a length of five feet, but yields hardly any oil, and thus is of no economic value. Peculiar to this coast.

*Galeorhinus galeus*, Tope, Oil Shark—Very abundant everywhere south of San Francisco from May to August, when it enters lagoons to spawn, and is taken in great numbers for the oil furnished by the liver. Soquel and Monterey, and more especially Westminster and Newport, near San Luis Obispo, are the places where this fishery is carried on. It feeds on any other fish, but herring and similar silvery fish make the best bait. It attains a length of five feet, and a weight of fifty or sixty pounds, but thirty-five to forty pounds is more usual.

From two thirds of a gallon to a gallon of oil is obtained from the liver. The pectoral, dorsal, and caudal fins are cut off and sold to the Chinese, at twelve and a half cents per pound, for soup fish.

The Tope occurs in all temperate and tropical seas, as do also *Galeocerdo tigrinus*, *Carcharinus glaucus*, and *Eulamia lamia*. The second of these is the Blue Shark of the British coast, and attains a length of eleven feet.

*Lamna cornubica* (Porbeagle); *Isurus oxyrinchus*—These two allied species seem to be rare on this coast, yet undoubtedly occur. Doctor C. L. Anderson, of Santa Cruz, has a drawing of an example of the former species taken at that place in 1879, and the jaws of another specimen were procured by Professor Jordan at Wilmington. A small individual of the latter species was sent from Monterey Bay

to San Francisco in August last as a curiosity, and was secured by Professor Jordan. It is common in the British Channel, and occurs in the Mediterranean, in the Atlantic Ocean, and on the shores of Japan.

The *Isurus* is found on the Atlantic Coast of the United States.

*Carcharodon carcharias*, Man eater, White Shark, Great Blue Shark—The White Shark, the terror of the waters, the "man eater" who swallows sailors and carries off innocent bathers, has been found in Monterey Bay. Lest this announcement should bring ruin to the bathing-houses of Santa Cruz and Monterey, it is well to remark that either because of his comparative rarity, or because he has not yet learned to relish the taste of Caucasian flesh, he does not appear to have ever made off with any of the fair Nereides who frequent those well known beaches. Professor Jordan secured the jaws of an example twenty feet in length, taken at Soquel this year, and records the capture of one twenty feet in length at Carmelo. A few years ago a young sealion, weighing one hundred pounds, was taken from the stomach of one of these monsters caught at Soquel.

The only useful part of this fish is the liver, from which oil is expressed. This large and dangerous shark, which attains a length of thirty-six feet, occurs in all oceans and large seas of temperate and tropical regions.

*Somniosus microcephalus*, Black Ground Shark, Nurse Shark—This species is not recorded south of Puget Sound, where it is not very uncommon, and is occasionally taken on trawl lines set for dog-fish. It attains a length of eight feet, and is very sluggish, lying in the water like a log. The livers are used for making "Dog-fish Oil."

*Squalus acanthias*, L., Dog-fish, Spinarola—The "Piked Dog-fish," is found at Santa Barbara and Monterey, but is not abundant south of Puget Sound, where it is taken in vast quantities for the oil in its liver. It has a long spine before each of the two dorcals.

It inhabits deep or quiet bays and channels, and comes into shallow water in pursuit of schools of herring and salmon. Its chief food is the herring, but it eats everything it can, even its own young, which in Puget Sound are born in June.

It reaches a length of three feet, and inhabits all temperate seas of both the northern and the southern hemispheres. It occurs on the coast of Alaska as far north as Kodiak.

#### CLASS MARSIPOBRANCHII.

*Entosphenus tridentatus*, Large Lamprey—The species of Lamprey, formerly supposed to be five, have under investigation dwindled to two, namely the small *Ammocetes plumbeus* and the large *Entosphenus tridentatus*.

The latter reaches a length of two feet, is extremely fat, and has been observed at various points from Santa Cruz to Puget Sound. Like other lampreys it ascends rivers in spring to spawn. It runs up the Columbia in June. In Humboldt county, and probably elsewhere, it is occasionally eaten.

*Ammocetes plumbeus*, the small Lamprey or Lamperina, is very thin and small, often only about six inches long, and never over a foot.

*Polistotrema dombeyi*, Hag—The habits of the Myxines or Hags are, in a general way, well known, but the writer had never wit-

nessed the result of their ravages until this summer, when, on a visit to Monterey, where it is especially abundant, he was shown by Professor Jordan several rock cod which had been literally eaten alive by them, and had washed ashore mere shells. The hag enters by the gills, or occasionally by devouring the eye, and eats its way into the flesh of its victim, consuming it until it dies of weakness, but presumably leaving, like the ichneumons that prey upon butterfly caterpillars, the vital parts untouched till last. Shells of fishes thus eaten are frequently found in Monterey Bay, and are usually quite fresh, as if but just dead. The hag is fitted for its work by its suctorial mouth, terminal, soft, unprovided with jaws, and forming a round opening when in use, as well as by two rows of teeth on each side of the gullet. The mouth is surrounded by barbels, and in preserved examples is scarcely visible. The aspect of the hag, the lowest of vertebrates except the lancelet (if the latter has any right to be called a vertebrate), is strongly suggestive of a relationship between worms and vertebrates, and the observer can scarcely maintain the superiority of such a creature as this over beings organized as intricately as insects and crustacea. In form it is wormlike. There is no fin above or below to break the continuous round body, and the barbels suggest a worm, rather than a vertebrate; yet a vertebrate it undoubtedly is, having the nervous system and backbone of a vertebrate, although the former is of low order, and the latter is but a cartilaginous rod, with a rudimentary cranial expansion at its anterior extremity.

This species, which is widely spread, was first noticed as Californian by myself, and was described as new, under the name of *Bdellostoma stouti*, from an example taken in Eel River, Humboldt County, California—a river which derives its name not from the presence of eels, but of lampreys and hags, both of which are sold for food as eels. The number of gill openings is not—at least in some examples—equal on both sides, but is twelve on one side and eleven on the other.

The fishermen of Monterey declare that one of these parasitic fishes will devour a fish of six to eight pounds weight in a single night. It is especially destructive to fish taken in gill-nets. When the hulk is taken out of the net, the hag scrambles out with great alacrity. It reaches a length of fourteen inches, and is not used for food at Monterey.

## RECEIPTS AND EXPENDITURES.

The following is on account of receipts and expenditures since our last report:

### *Receipts.*

November 1, 1879—By cash on hand as per last report.....	\$3,873 70
July 29, 1880—By cash, State appropriation .....	5,000 00
Total .....	<u>\$8,873 70</u>

### *Expenditures.*

November 1, 1879—To paid H. C. Marks, balance due, copying report for printer ---	\$60 00
November 23, 1879—To paid Cowdery & Preston, attorneys, in suits in Fishways, Stanislaus, and Merced .....	23 00
December 24, 1879—To paid expense in transporting 300 carp from Washington.....	55 55
December 27, 1879—To paid Livingston Stone, on account of hatching 2,500,000 salmon .....	1,054 50
January 1, 1880—To paid half month fish hatching, J. G. Woodbury, December, \$75; coas oil, express, wood, and sundries, \$23 45.....	98 45
January 3, 1880—To paid postage on reports, \$5; express on 50,000 trout eggs, \$22 60.....	27 60
January 26, 1880—To paid L. Stone, 50,000 trout eggs, \$204 80; S. P. Baird, eleven fish cans, \$73 60.....	278 40
January 26, 1880—To paid H. Pither, 2,500 cat-fish, barrels, and express.....	80 60
January 26, 1880—To paid drafts exchange, \$1 00; Wells, Fargo & Company, expressage on cat-fish, \$9 75.....	10 75
January 31, 1880—To paid Stratton, cartage, \$2; brush and broom, \$2 35.....	4 35
January 31, 1880—To paid J. G. Woodbury, on account of January, fish hatching.....	30 00
February 3, 1880—To paid J. A. Richardson, three quarter month's labor, January.....	75 00
February 16, 1880—To paid Marks, copying notices, \$10; J. G. Woodbury, on account of fish hatching, \$60.....	70 00
February 20, 1880—To paid expense for distributing cat-fish in Alameda.....	6 40
March 6, 1880—To paid drayage and express, \$2; Woodbury, balance for January, fish hatching, \$60.....	62 00
April 3, 1880—To paid two telegrams, \$1 15; Stratton, cartage, \$7; brush, etc., \$2 50.....	10 65
April 26, 1880—To paid J. B. Campbell, 33,000 trout eggs, \$100; express, etc., \$3 50.....	103 50
April 26, 1880—To paid J. A. Richardson, three months' labor to May first.....	300 00
May 6, 1880—To paid freight, express, salt, telegrams, paint, and other items.....	18 85
May 6, 1880—To paid Woodbury, three months' fish hatching to May first.....	450 00
June 7, 1880—To paid People's Ice Company's bill, ice, February to May.....	38 80
June 17, 1880—To paid fare of assistants for transporting shad to Tehama.....	38 25
June 25, 1880—To paid express on cans from Yosemite.....	90
July 1, 1880—To paid Woodbury, expenses on carp for Mare Island.....	24 65
July 15, 1880—To paid Marks, on account of labor, copying.....	20 00
July 16, 1880—To paid A. W. Von Schmidt, examination of dams on Pitt River.....	100 00
July 30, 1880—To paid Marks, balance for labor, copying.....	80 00
July 30, 1880—To paid H. Pither, expense for distributing 5,300 cat-fish.....	122 70
August 2, 1880—To paid H. Pither, expense for distributing 2,500 cas-fish.....	55 50
August 2, 1880—To paid L. Stone, balance due on hatching 2,500,000 salmon .....	45 50
October 11, 1880—To paid express on fish cans to San Leandro.....	1 00
December 8, 1880—To paid Lockington, report on Pacific Coast fish.....	100 00
December 8, 1880—To paid Wells, Fargo & Company, express on cans, \$1; J. H. Stone, salmon statistics, \$50.....	51 00
December 8, 1880—To paid Marks, on account, copying report.....	20 00
December 17, 1880—To paid H. Pither, catching, transporting, and distributing 2,750 cat-fish.....	95 50
December 22, 1880—To paid H. D. Dunn, gathering salmon statistics.....	20 00
December 22, 1880—To paid L. Stone, hatching 2,250,000 salmon .....	1,002 50
January 3, 1881—To paid galvanized wire.....	1 25
January 3, 1881—On hand to balance .....	4,258 55
Total .....	<u>\$8,873 70</u>

This balance of \$4,258 55 will be consumed in the hatching of native and foreign fish during the present Winter, and in the importation of striped bass and shad in the Spring.

All of which is respectfully submitted.

B. B. REDDING,  
S. R. THROCKMORTON,  
J. D. FARWELL,

Fish Commissioners.



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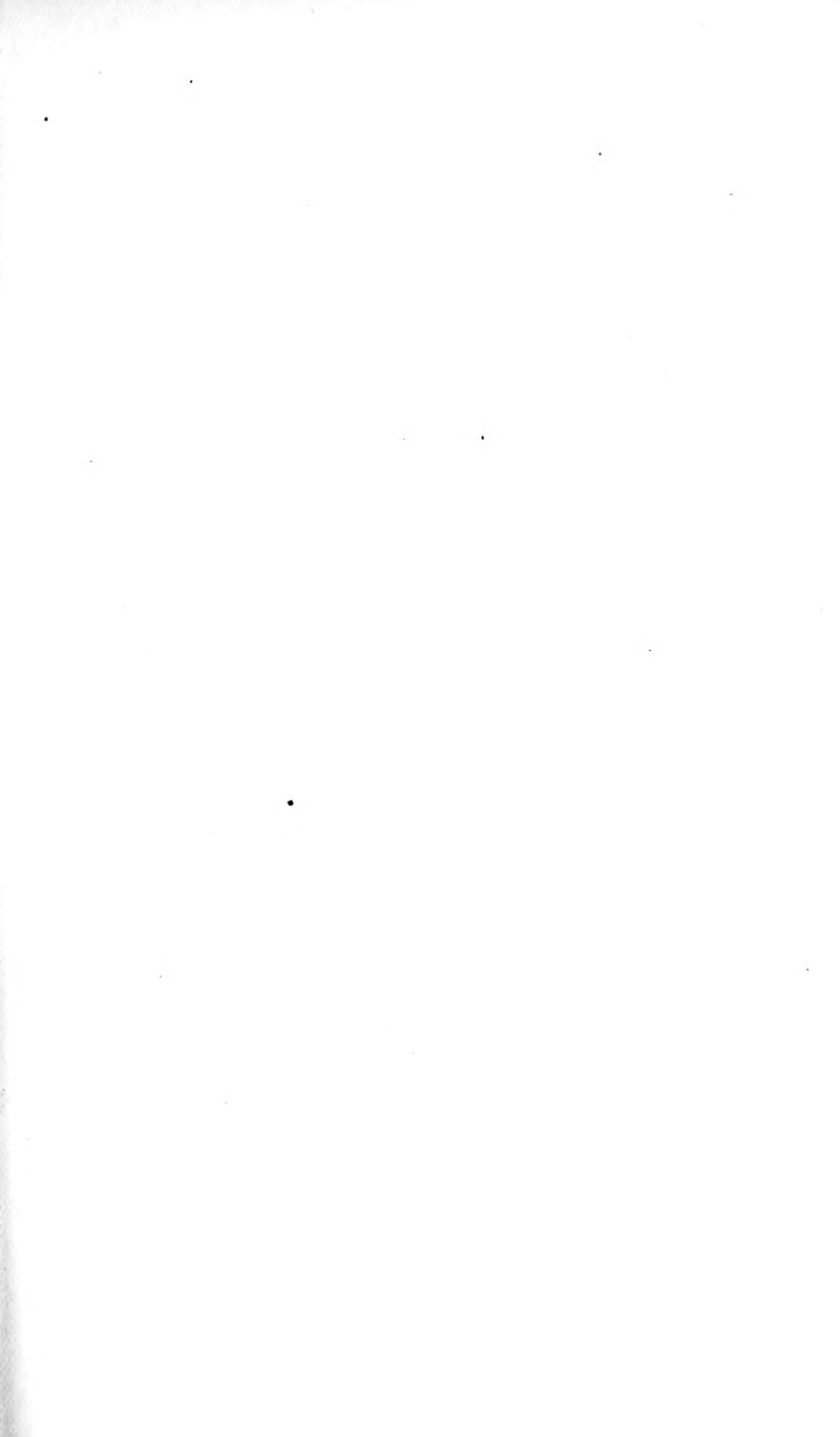
W. H. Rogers ----- Amherst.

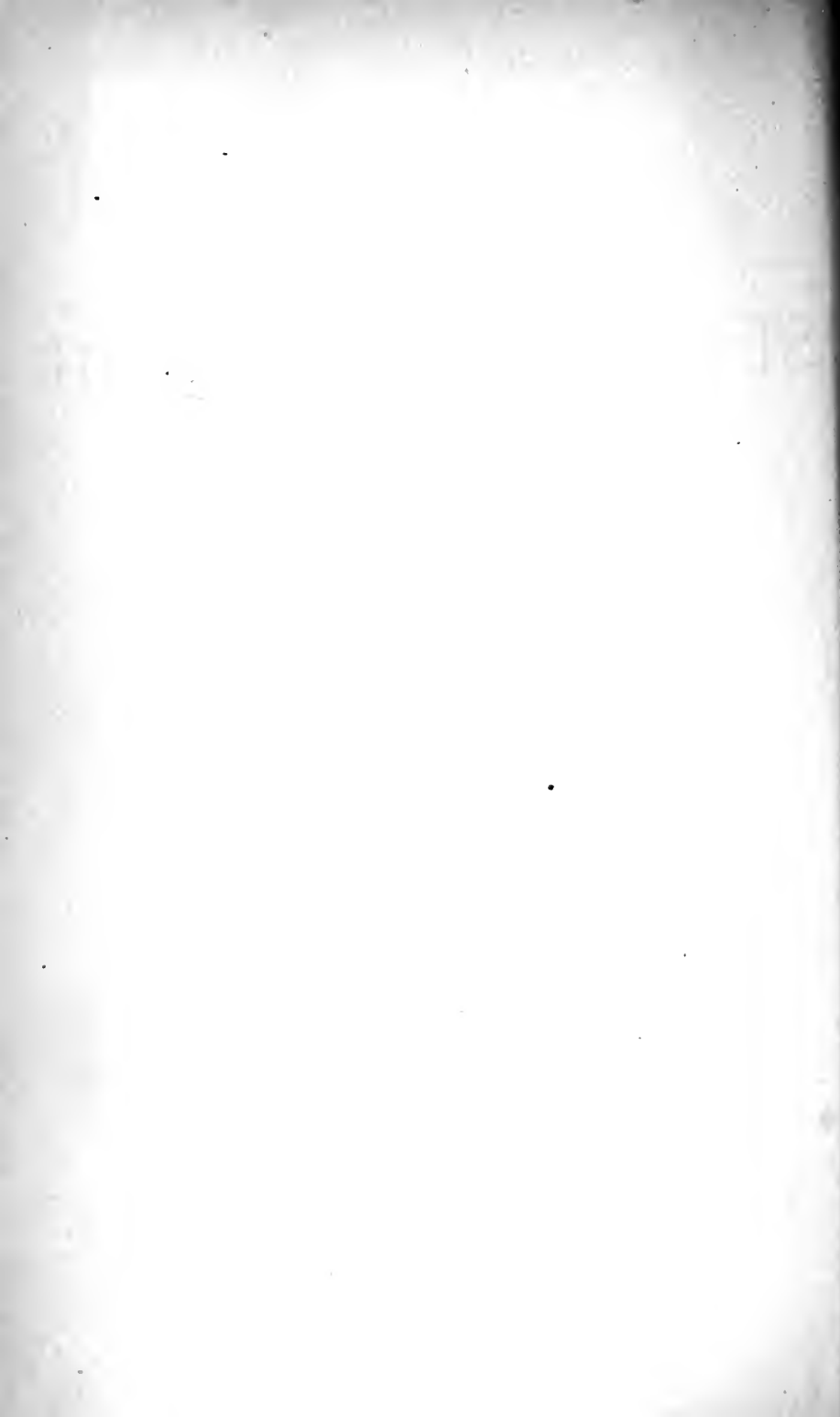
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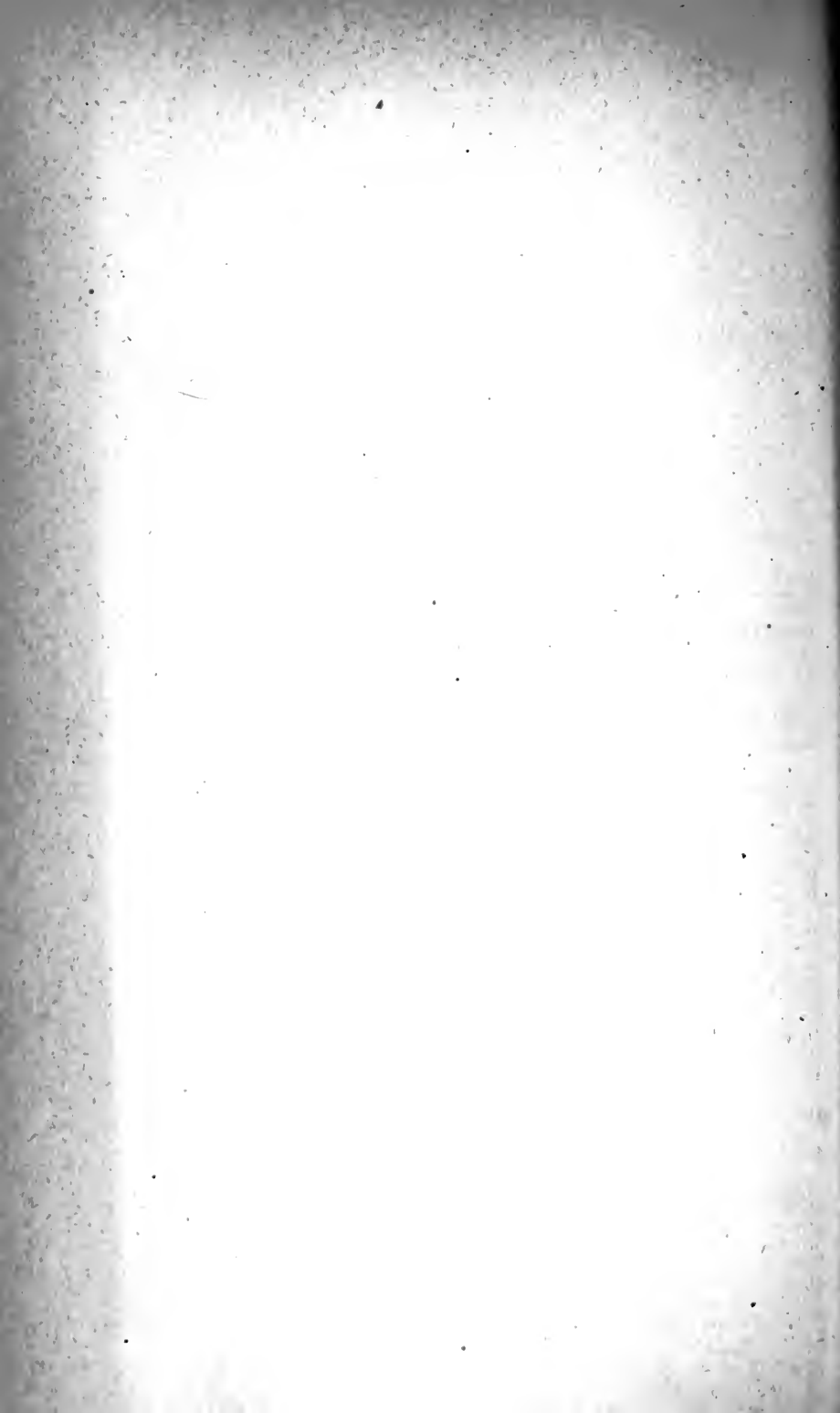


SIXTH REPORT  
OF THE  
STATE BOARD OF HEALTH  
OF  
CALIFORNIA,

FOR THE YEAR ENDING JUNE 30, 1880.



SACRAMENTO:  
STATE OFFICE :: J. D. YOUNG, SUPT. STATE PRINTING.  
1880.



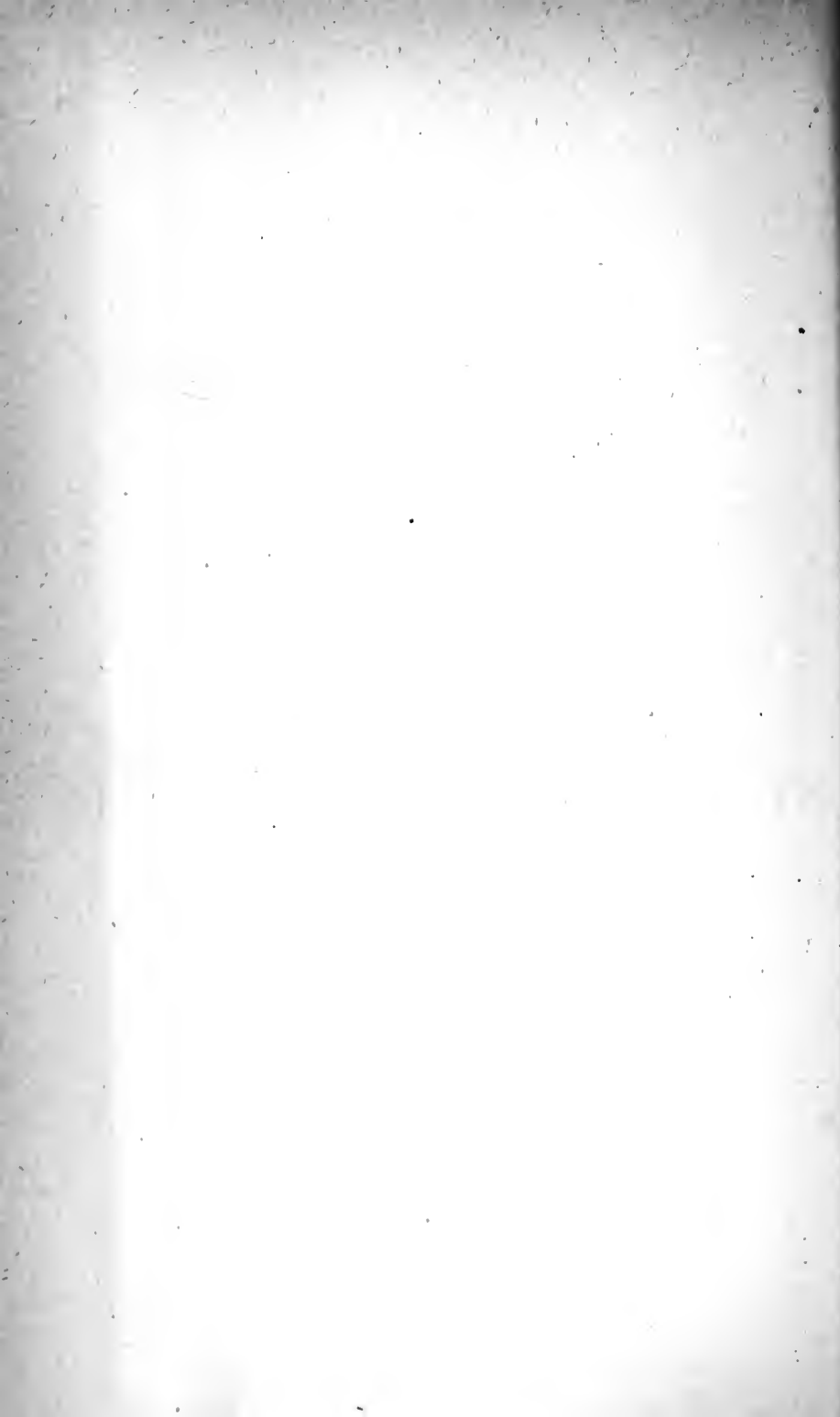
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REPORT

OF THE

STATE BOARD OF HEALTH.

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## MEMBERS OF THE STATE BOARD OF HEALTH.

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HENRY GIBBONS, SR., M. D., President. -----San Francisco.  
W. R. CLUNESS, M. D.-----Sacramento.  
J. P. WIDNEY, M. D.-----Los Angeles.  
C. C. MASON, M. D.-----Chico.  
J. W. BREYFOGLE, M. D. -----San José.  
F. W. HATCH, M. D.-----Sacramento.

F. W. HATCH, M. D.,

Permanent Secretary.

## REPORT OF THE STATE BOARD OF HEALTH.

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*To his Excellency* GEORGE C. PERKINS, *Governor of California:*

The State Board of Health, in presenting their sixth report, desire to congratulate you upon the general healthfulness which has characterized the State during the year ending June thirtieth, eighteen hundred and eighty. With the exception of a rather unusual prevalence of pneumonia during the Winter and Spring months in certain localities and districts, no disease has generally prevailed—no widespread epidemic has visited our borders. The report of the Permanent Secretary, herewith submitted, affords a general idea of the work of the Board during the past year, and contains suggestions to which we desire to call the attention of your Excellency, and, through you, that of the Legislature. One of them, the chief in importance, relates to the subject of registration.

The basis of all sanitary work is a sound, practical system of registration. We must know the death-rate of different localities, and the diseases which have determined it, in order to understand and be prepared to investigate the sanitary relations of the State in its several sections—the causal relations with which disease is associated, the local tendencies, the effects of varying conditions and circumstances. We must know where disease prevails, in order to be intelligently guided to the adoption of measures of sanitation. We must know the ratio of births to deaths, in order to reach a just conception of our social condition; whether we are keeping up the natural and normal standard of increase; whether we are self-sustaining in population. Taking the statistics of births and deaths now received at the office of the State Board of Health as a guide, there is no city in the State that is not retrograding, so far as affected by the natural law of increase—so far as we depend upon ourselves; not one that is not losing population; not one that gains by births what it loses by deaths. Yet, we know that any such inference would be fallacious.

Some consideration and study has been paid during the past year to the subject of the mineral springs of California. They constitute one of the important interests of the State; one of our great sanitary resources, attractive to invalids in our own State, as well as to those from abroad. The obstacle to a complete understanding of the subject, consists in the absence of any analysis of many of our most popular springs, and possibly, the unreliability of the analyses reported of some others. This, too, is the source of the distrust with which these valuable waters are regarded by many invalids, as it is

of the evil effects of their injudicious, hap-hazard, and indiscriminate use.

The recommendation of the Secretary upon this subject deserves consideration by the Legislature of the State.

We give below a general statement of receipts and expenditures:

#### STATEMENT

*Of the condition of the appropriation for mileage and contingent expenses of the State Board of Health for the 31st fiscal year, ending June 30th, 1880.*

Unexpended balance, 30th fiscal year, July 1st, 1879 -----	\$394 10
Appropriation for 31st fiscal year -----	1,000 00
Total -----	<u>\$1,394 10</u>
Amount expended -----	<u>1,282 22</u>
Balance unexpended -----	\$111 88

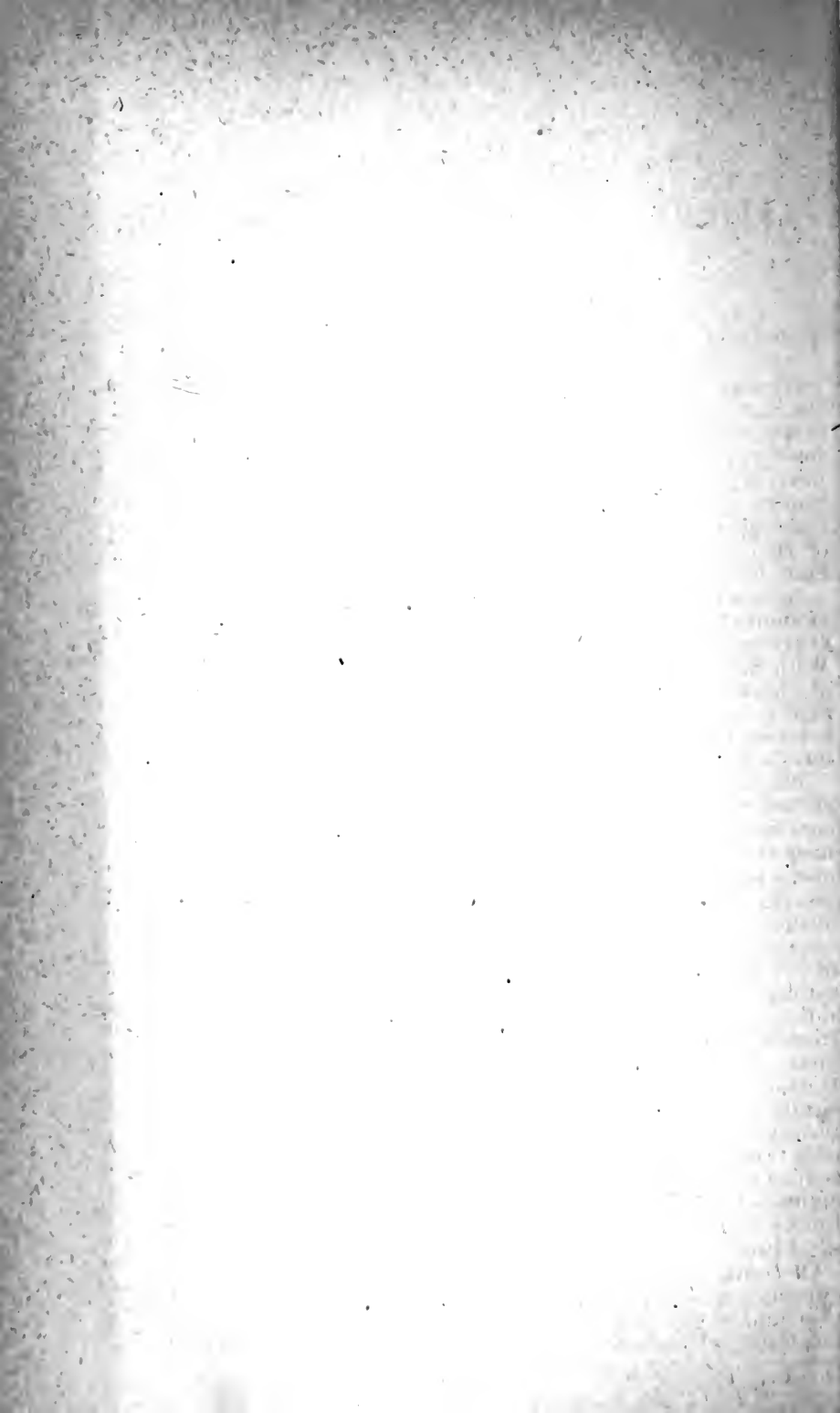
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REPORT OF THE PERMANENT SECRETARY

TO THE

STATE BOARD OF HEALTH.

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# REPORT OF THE PERMANENT SECRETARY.

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*To the State Board of Health :*

GENTLEMEN : By reason of a provision of the new Constitution of the State of California, recently adopted and ratified by the people, and the changes in the sessions of the Legislature required by that instrument, necessitating another meeting on the first of January next, it is made my duty to depart from the usual rule of biennial reports, and to submit to you, and, through you, to the Governor and Legislature of the State, an abstract of the work of the State Board of Health during the past year, together with a general review of the State in its sanitary relations.

In entering upon this duty, it is gratifying to be able to record the evidence of an improved healthfulness—a smaller death-list from every portion of the State from which statistics have been received. With the exception of the pneumonia prevalent during the Winter of eighteen hundred and seventy-nine and eighteen hundred and eighty, no epidemic disease of a serious character has visited our borders, and the mortality by diseases usually considered preventable has shown a gratifying reduction.

The ratio of deaths to population for some of these very diseases, as well as for the total mortality, for some localities, may seem to contradict this statement. Our calculations upon this subject have hitherto been based upon an *estimated* population, and although every reasonable care had doubtless been taken to arrive at accurate results, by the best available means, the recent census taken by authority of the general Government has shown them to be in some important cases erroneous. This is especially true of the large cities of the State. The population of San Francisco, for example, was estimated, mainly, it is believed, upon the basis of the local enumeration taken by the compilers of the City Directory, to have reached three hundred and five thousand on the first of April of the present year ; yet the United States census makes it two hundred and thirty-three thousand. By the same method of calculation, or rather upon similar evidence, the population of Sacramento was assumed to be twenty-five thousand, whereas, according to the Census Marshals, it is only twenty-one thousand five hundred ; Los Angeles has been reduced from fifteen thousand to eleven thousand one hundred and eighty-six ; Marysville from seven thousand to five thousand eight hundred and ninety ; Stockton from fourteen thousand to ten thousand two hundred and eighty-eight.

Of course, we are compelled to adopt the census enumeration as our guide in any calculations made upon the mortality of the present year, and, as just now observed, the results, even with a smaller actual mortality, will exhibit a higher ratio for each one thousand of popu-

lation. For the three cities of San Francisco, Sacramento, and Los Angeles, the difference in population is nearly one fourth.

It is probable that the actual population of these cities exceeds that given by the census. The enumeration was taken at a time when many families usually visit the various watering places of the State, or the sanitary resorts in the mountains. In some cases, whole families absent themselves for some months, and doubtless a certain number thus escaped the attention of the Census Marshals.

Before proceeding with the analytical details of this report, it becomes my painful duty to record the death of one of our number, Dr. M. M. Grannis, of Visalia, Tulare County. Doctor Grannis was appointed by the Governor and confirmed by the Senate, to fill a vacancy towards the close of the last session of the Legislature; but, by reason of sickness, had never taken his seat as a member of the State Board of Health. His disease was consumption, evidently hastened in its termination by malarial influence and the prosecution of the active duties of his profession in a highly malarious region. He was a young man, ardently devoted to professional work, possessing a sound judgment, readiness of discernment, and a warm heart. He was, besides, a close observer of the existing causes of disease in his section of the State, and, as Secretary of the County Board of Health, took an active interest in sanitary work. His loss will be seriously felt by the members of the profession in Tulare County, and this Board has been deprived of the services of one who would have made an earnest and efficient member.

Since the last report of the State Board of Health, the publication of the bulletins of sickness and deaths, then conducted bi-monthly, has been continued in a monthly form—usually issued on the tenth day of each month. A large majority of the correspondents of the Boards, from whose reports these bulletins are compiled, have responded favorably to the request made to them to send in their returns sufficiently early in the month to make the prompt publication of the bulletin generally practicable. With an increased number of correspondents, and strict regularity in the transmission of reports to this office on or near the first of each month, the bulletins will, it is believed, assume greater interest, and become valuable for future reference, as showing the prevalence of local or sectional disease, and the occurrence and progress of epidemics.

A table, representing a summary of the bulletins for the first six months of the present year, is given below :

*Abstract of the Reports of Deaths and their causes in the following Cities and Towns of California, during the six months ending June 30th, 1880.*

### CITIES AND TOWNS.

Only those diseases which are called *zymotic*, or are dependent to a considerable extent upon climate, are included in the circular.

An examination will show the extent to which contagious diseases have prevailed in the localities reporting. It will also serve to show the irregularity with which reports have been received, and the difficulties encountered in the attempt to keep a uniformly complete record. Several localities, though not represented by the full six months, have been heard from regularly since the commencement of our correspondence with them, which was not until after January.

It has been customary, each month, to compare the mortality reports with those of *sickness*; also each month with that preceding, and to give, as far as possible, the ratio of deaths to population per one thousand. This is done under the head of remarks accompanying each bulletin.

It is to be regretted that the local Boards of Health, established under an Act of the Legislature, passed four years ago, have not more generally complied with the law requiring reports to be made to the State Board. In a few instances, Boards have been properly established and organized, one or two meetings held, and the sanitary interests of the localities have been mainly left to take care of themselves. They seem to have been regarded as purely *local* Boards, having *local* duties to perform, *local* inroads of disease to guard against, while their higher and wider sphere as parts of a system, each member of which is more or less dependent upon another—a system which is designed to embrace and illustrate the sanitary interests of the whole State, and the work of reform to which our efforts in California are directed—appears to have been overlooked. The law itself is a good one. Perhaps the wisdom of the Legislature can devise means for its enforcement.

Since the last report of the State Board of Health, the Secretary has visited a number of localities with the hope of obtaining correspondents from portions of the State not heretofore in communication with this Board, so as to be able to embrace a much wider field in our reports, and thereby to obtain a more accurate knowledge of the local causes of disease in this large and diversified State. That very interesting region of country in the southern portion of the San Joaquin Valley was one of these—a region rendered specially important by the progress of the system of irrigation latterly introduced, and which will, doubtless, form, at no late day, a prominent factor in the sanitary condition of the valley. Among the places visited were Modesto, Merced, Fresno, Folsom, Suisun, and Visalia; and, further south, Los Angeles. From the latter, regular reports have always been received, and it is believed that they hereafter will be obtained from those first mentioned.

With the same objects in view, and to revive a neglected correspondence, localities in Napa County—as Napa City, and St. Helena, and one in Sonoma county—Petaluma—have been visited. It is proposed to endeavor in the same manner, by personal appeals, to obtain a more extensive correspondence from the mountains.

At a meeting of the State Board of Health, in April, eighteen hundred and eighty, the subject of small pox and its prophylaxis, by vaccination, was brought up for discussion, and the President and Secretary were requested, whenever in their judgment it seemed necessary, to prepare and issue a circular upon the subject, addressed to the public.

Later, the occurrence of a few cases of small pox, the disease having been, according to the best information obtainable, imported by steamer from China, in San Francisco, and subsequently in a factory near Oakland, presented a proper occasion for presenting the subject, in the form of an appeal, in behalf of general vaccination. The following circular was issued and sent to local Boards of Health, to the correspondents of the Board, and to nearly every newspaper in the State:

CIRCULAR OF THE STATE BOARD OF HEALTH.

TO THE PUBLIC: At a regular meeting of the State Board of Health, held in this city January sixteenth, eighteen hundred and eighty, the President and Secretary were directed to issue a circular whenever, in their judgment, the presence of smallpox in the State seemed to demand it, impressing upon citizens the importance of vaccination, and urging its general adoption. Cases of smallpox have recently occurred in the metropolis of the State, and in or near some other neighboring cities; and, although the disease has nowhere reached the measure of an epidemic, and need occasion no present alarm, it is the part of prudence to take early warning and prepare for its possible more general prevalence. The constant communication going on between the City of San Francisco and the interior of the State, favors at least a liability that the citizens of the latter may contract disease and convey it to their homes.

It has been recognized as a part of the history of smallpox that it occurs at certain intervals, at periods not absolutely accurate or well defined, indeed, but sufficiently distinct to attract attention. It is probable that this periodicity is due to changes taking place in the population more than to any inherent law of the disease. During the prevalence of an epidemic of smallpox, almost every one, under the influence of fear or by force of municipal law, is sooner or later subjected to vaccination, and upon many of those previously vaccinated, the operation is repeated. Only the unprotected are attacked, and the epidemic dies out at length for want of fuel. A period of rest ensues, during which a certain proportion of adults who have been vaccinated in youth acquire renewed susceptibility, and others have been gradually but continuously added to the population by birth or immigration who have never had the disease nor been vaccinated. The fertility of the soil is renewed, ready for the reception and propagation of the germs whenever accidentally introduced.

We, in California, have passed through one of these periods of rest. Numbers have been added to the population of both city and country, and inasmuch as where there is no cause for alarm the duty of vaccination is likely to be postponed, many of these are now unprotected; new material available for the disease has sprung up.

While, therefore, the necessity of vaccination with those who have never been subjected to this safe and simple expedient is, in times of threatened danger, specially urgent, this necessity does not apply solely to them. It is a conceded fact in the history of vaccination that, in very many cases, the immunity it affords is only limited, or for a time. Perfect while it lasts—as perfect, it is believed, as a previous attack of smallpox itself—the duration of the insusceptibility varies with different individuals. Though, in some instances, it is unquestionably permanent through life, it is safe to say that revaccination should always be tried after the expiration of eight or ten years, or, otherwise, whenever during the prevalence of smallpox it is desirable to be assured of protection. By the observance of this rule, and the general adoption of primary vaccination in youth, it is equally safe to say that one of the most loathsome diseases which afflict mankind may be effectually robbed of its terrors.

In thus urgently recommending a general resort to vaccination as a means of protection against smallpox, the State Board of Health cannot too strongly deprecate the careless and unscientific manner in which it is often performed and its result determined. In very many cases such vaccinations serve only to deceive through a false sense of security.

Attention is respectfully called to the following general rules, the value of which has been demonstrated by the experience of the medical profession:

1. The virus used should be of known purity. Whether in the form of the dried crust, or as lymph, certain precautions are necessary for the safe and effectual performance of the operation. This it should be the duty of the family physician to attend to. Self-vaccination, or vaccination performed by unprofessional friends, unqualified to distinguish the *true* sore or vesicle from that which is spurious, affords but slight protection against smallpox. It is at least uncertain. It may be genuine, or it may not. It is to this cause that so many reputed failures in the conservative influence of vaccination are to be attributed, and that the process itself has been regarded by many with suspicion and distrust.

2. Revaccination during the prevalence of an epidemic, or after the lapse of eight or ten years from the primary operation, is considered necessary. A scar upon the arm, the result of a previous vaccination, affords no certain evidence that the protective influence is not lost. It has been observed that vaccination performed during the active period of an epidemic is apt to be more severe in its effects than under other atmospheric conditions.

3. Virus obtained from the arms of revaccinated persons should never be employed. There is no evidence that it possesses any protective power.

4. With care in the selection of virus, the danger of contracting disease thereby is reduced to a minimum. It is pretty certain that only *one* disease ever has been introduced by vaccination, and with ordinary care this is impossible. It is better to avoid virus taken from adults.

5. The dangers attributable to the operation itself are too light to weigh against its positive benefits. It has been estimated that one serious accident may occur in one case in one hundred thousand—certainly not more frequently than would be expected from any similar wound or abrasion of the skin. Properly done, with due precaution as to the health and vigor, and the age of the subject, and the source of the virus used, it may be confidently affirmed to be altogether without danger.

6. No so-called vaccination which does not result in what is known as a characteristic sore or vesicle, pursuing regular changes or periods of development, is safely to be relied upon. Not infrequently the sore upon the arm arising from the insertion of worthless virus is even more severe than that resulting from the genuine lymph.

There is no other method than that universally adopted of making the insertion upon the abraded skin, or beneath the skin of some portion of the body, which can with any degree of safety be relied upon.

7. It is an interesting fact in the history of contagious diseases, and one of great practical importance, that a certain more or less definite time intervenes between the reception of the contagion and its manifestation in the body of the individual affected—a period of latency, called the period of incubation—during which certain processes are going on in the system which are somehow preparatory to the development of the disease.

In smallpox this period may be stated, in a general way, to be twelve days for the beginning of fever, or fourteen for that of the eruption. In the vaccine disease, or cowpox, it is three or four; and such is the protective or antagonistic power of the latter, that if its virus or contagion be inserted even after exposure to smallpox, its shorter incubative period enables it to anticipate the other, and, if it do not altogether prevent it, to induce such a deviation from its regular course as to essentially modify it and deprive it of its greatest danger. Hence the importance of an early vaccination after exposure to smallpox.

8. Bovine virus, or that taken directly from the cow, is fashionable, and in consequence of the excellent arrangements which have been made by different parties, it can at all times be obtained fresh and pure. It is reliable, and is to be recommended. Yet, there is strong reason to believe—and such is the opinion of the highest authorities on this subject—that humanized virus, obtained from the arm of a healthy child, loses none of its protective efficacy, even when propagated through generations.

F. W. HATCH, M. D.,  
Permanent Secretary State Board of Health.

SACRAMENTO, August 3d, 1880.

H. GIBBONS, Sr., M. D.,  
President State Board of Health.

Since then, a few additional cases of small pox have been reported from San Francisco, Oakland, and Stockton, but it can nowhere be said to be strictly epidemic, nor has it appeared, in the reports made to this Board, as a cause of death, except in one case in San Francisco. In the latter city the Chinese quarter seems to have been the focus of the disease, and the crowded condition of their tenement houses is well adapted for its diffusion. It is creditable to the energy of the Health Officer that prompt, even though extreme, measures have been taken to discover the hiding-places of the sick, and to disinfect the loathsome premises of this careless and utterly indifferent class of people.

#### STATISTICS FOR EIGHTEEN HUNDRED AND SEVENTY-NINE AND EIGHTEEN HUNDRED AND EIGHTY.

From the reports of correspondents, and the returns made to this Board by the local Health Boards, the following statements have been prepared. It will be seen that, notwithstanding the reduction effected by the late census in the population of the principal cities, just now alluded to, the result compares favorably with previous years:

*Arranged for Sexes, Ages, Nationalities, Diseases, and Months, with Proportion of Deaths to Population, from June 30th, 1879, to July 1st, 1880.*

(i)  $\sum_{i=1}^n \lambda_i = 1$  and  $\lambda_i \geq 0$  for all  $i$ . (ii)  $\lambda_i$  shows the number of times by each driver  $i$ , with three series: *avg* (average) and *min* (minimum) and the month

The principal features of the preceding statements deserve some explanation and comment.

The total mortality, in eighteen hundred and seventy-eight, as reported by thirty-nine localities, was 6,654; during the twelve months ending June thirtieth, eighteen hundred and eighty, it was 5,809, in twenty-nine localities. The ten reports received in eighteen hundred and seventy-eight, and wanting this year, were from small towns or districts in the interior of the State, and included the statistics of none of the large cities. The difference between the total of the previous year, and the total of this, is 843—much greater than can be ascribed to the missing reports. Twenty-four identical localities, including the larger cities, give 6,406 deaths in eighteen hundred and seventy-eight, against 5,742 for the year ending with June, eighteen hundred and eighty. Of the large cities themselves, *i. e.*, San Francisco, Sacramento, Stockton, Marysville, and Los Angeles, the aggregate mortality was 5,699 in eighteen hundred and seventy-eight, and 5,194 in eighteen hundred and seventy-nine and eighteen hundred and eighty.

The rate of deaths in 1,000 of population last year was given, for San Francisco, at 15.8; for Sacramento, 17.1; for Marysville (nine months), 6.58; and in Los Angeles, 11.1. This was calculated from the then estimated population. Upon the basis now before us, afforded by the census and the mortality of the present year, these figures must be raised to 18.6, for San Francisco; 19.7, for Sacramento; 21.9, for Marysville; and 20.2, for Los Angeles. With the same population this year, as these cities were estimated to have last year, the result would have been 14.4, 15.5, 18.4, and 15.06, respectively.

This much by way of explanation seemed called for, in view of the apparent increase of the death rate in the cities of the State.

#### ZYMOTIC DISEASES.

The whole number of deaths reported to have resulted from zymotic diseases, is 715, or 12.3 per cent. of the total mortality of the year. Of these only 346 were children under *five* years of age, the total number dying under that age by all causes having been 1,664. In eighteen hundred and seventy-eight, 1,231 children died under this age, and of these, 680 fell victims to zymotic diseases—or, in other words, to causes supposed to be preventable. Of the above 715 deaths by this class, 460 were born on the Pacific Coast; 88 in the Atlantic States; 147 in foreign countries; and 18 are set down as of nativities “unascertained.”

Of the several members of this class, it will be seen that the **CONTAGIOUS** diseases—smallpox, scarlatina, measles, diphtheria, and whooping-cough—were responsible for 210 deaths.

**DIPHTHERIA** alone gives 101, of which 67 were in San Francisco, and 34 in the other twenty-eight localities reporting. If, as would probably be correct, we include under this head croup, the mortality by diphtheria would be raised to 140, yet the contrast between the metropolis and the interior towns would remain about the same.

**WHOOPING-COUGH** was epidemic in a wide area of the State; yet the deaths attributed directly, or primarily, to this cause, were only 58.

**DIARRHEAL** diseases exhibited a low mortality—only 140; a little over two per cent. of the total by all causes. One hundred of these were by cholera infantum.



Of the FEVERS, we find 157 set down to TYPHOID and TYPHO-MALARIAL types. True enteric fever is met with in California, due, it is believed, to its specific cause; but, judging from personal experience and the testimony of other observers, it is far less common than what is now usually designated as typho-malarial fever. The malarial element prevailing over a very large part of the State materially modifies the type of febrile disease. Of those distinctly classified as "typhoid," 85 were reported from San Francisco.

Remittent and intermittent fevers added only 42 to the death record of the State, which, considering the general prevalence of malarial influences, is a low mortality, and evinces the mildness of these fevers in California.

Alcohol was reported to have been directly or indirectly responsible for 63 deaths, 24 being among females. This is an increase over the result for eighteen hundred and seventy-eight. Of the victims to this vice, 41 were foreigners, 16 from the Atlantic States, and 2 born on the Pacific Coast. The statistics of alcohol make no mention of the deaths more remote and hereditarily attributable to it, many of which may doubtless be found among the accidents by diseases of the brain and nervous system—267 of these, more than one half having occurred among children not five years of age.

#### CONSTITUTIONAL DISEASES.

From CONSUMPTION we have a record of 954 deaths, the nativities being 147 on the Pacific Coast, 270 on the Atlantic border, and 524 in foreign countries, and 13 unascertained. Those reported from the former include several of the native or half-breed population of southern California, and 22 infants under five years of age. It is not certain that the native races of California are prone to consumption. Reports are contradictory, possibly because no distinction is made between the unmixed population—Mexican—and the generally lower race of half-breeds. Medical gentlemen, familiar with the facts, deny that they are so; but it is certain that the mode of life led by many of the lower class, the insanitary conditions by which they are surrounded in the cities, as in Los Angeles, for example, and their general disregard of hygienic rules, is such as would be likely to develop any existing tendency to the disease.

Why the foreign population should peculiarly suffer from consumption in California, would seem to present an interesting subject for inquiry and investigation. But it must be remembered that the foreign population in San Francisco is largely in the majority over those American born, and the statistics from that city control those of the State, so far as they are derived from the returns received at this office. The foreign vote in San Francisco is said, on good authority, to be about thirteen thousand in excess of the American vote; and it is estimated that the total population of the former reaches near one hundred and forty-eight thousand, that of the native born being only eighty-five thousand. This estimate is strengthened by the fact, as reliably stated, that there are not less than seventy-five thousand communicants in the several Catholic Churches in the metropolis. Taking this view of the case, the discrepancy between the deaths among foreigners and native Americans is not so great as would at first sight appear. Probably, exposure, occupation—for the Irish people especially are generally hard work-

ers—and the irregular habits acquired by many, may exert some influence.

#### CANCER.

The statistics of cancer, imperfect as they are, possess considerable interest. It has become quite a formidable cause of death. One hundred and fifty-seven cases are reported, 79 being males, and 78 females. Of these, 109 were foreign born, or more than two thirds of the total number; 3 were born on the Pacific Coast, and 45 were from the Atlantic States.

Unfortunately, the seat of the disease is not often stated in the returns, though of the cases occurring in San Francisco from January first to July second, eighteen hundred and eighty, they are divided as follows: Cancer, 25; of stomach, 18; of other abdominal organs, 16; of rectum, 5; of tongue, 2; of face, 2; of lip, 1; of breast, 7; of uterus, 14; of ovary, 1; of neck, 1; total, 92. It is difficult to account for so many cases upon any existing climatic conditions; nor are the moral and physical influences under which our people live such as are thought capable of disposing to these new formations.

#### PULMONARY DISEASES.

As observed in the commencement of this report, PNEUMONIA was quite prevalent during the Winter and Spring months, affecting more especially the young and the old. It was the predominating feature in the mortality of a large portion of the State. Five hundred and five deaths are set down to this disease in the twenty-nine localities reporting; of these, 361 occurred in San Francisco, 35 in Sacramento, 14 in Marysville, and 18 in Los Angeles; or, 428 in four of the principal cities of the State, representing different sections.

In eighteen hundred and seventy-eight, when, likewise, the disease prevailed epidemically, 447 cases were reported, 319 being in San Francisco, 32 in Sacramento, 24 in Marysville, and only 4 in Los Angeles—382 in the same four cities. Of the decedents, 160 were under five years of age, and 135 above fifty years; in eighteen hundred and seventy-eight, 147 were under five years, and 101 above fifty years. According to nativities, we have them classified as having been born on the Pacific Coast, 198 (mostly children); in the Atlantic States, 98; in foreign countries, 205, and unascertained, 4.

Associated with Pneumonia was BRONCHITIS, the mortality being 105; or, 81 in San Francisco, 5 in Sacramento, 2 in Marysville, and 9 in Los Angeles. Of the victims of this disease, 57 were under five years of age, and 31 above fifty years; nearly two thirds (61) were natives of the Pacific Coast. All the acute pulmonary diseases gave 617 deaths, or 6.1 per cent. of the total mortality. The Winter and early Spring months in the Sacramento Valley were uncommonly cold, and the atmosphere was remarkably damp. Influenza prevailed generally with all classes. The prevalence of these and other diseases, particularly those of the zymotic class, has been even more clearly shown by the "sickness" reports, as forwarded to this office upon postal cards. They have been of great aid in estimating the healthfulness of localities, and have afforded information concerning their extent and progress which could not have been obtained from the mortality reports alone. For the kindness of the medical gentlemen who have volunteered to make these reports, there is at least due the expression of a grateful appreciation.

## INFANT MORTALITY.

We have no means of ascertaining the ratio of deaths among infants under five years of age to the total number living at that age, for the entire State. Yet, the census taken by the School Marshals during the early part of the year, will enable us to approximate very nearly for the localities from which our mortality reports have been received. For the statistics of population, I am indebted to Mr. Campbell, Superintendent of Public Instruction.

## STATEMENT

*Showing population under five years of age, and deaths at corresponding age in the following cities and towns in California, with death-rate per one thousand per annum, June 30th, 1879, to July 1st, 1880.*

CITIES AND TOWNS.	Children under five years.	Deaths under five years.	Rate per 1,000 per annum.
San Francisco	23,935	1,324	55.3
Sacramento	1,754	104	59.2
Stockton (six months)	939	17	36.2
Los Angeles	1,028	72	70.0
Marysville	347	12	34.6
Vallejo	725	15	20.6
Santa Barbara	427	17	39.8
Downieville (ten months)	55	2	43.6
Petaluma (ten months)	346	6	20.8
Chico (six months)	346	7	40.4
Placerville	116	1	8.6
San Bernardino Township	986	10	10.1
Sonoma (eight months)	112	1	13.3
Antioch (eleven months)	104	2	20.9
Merced (six months)	134	2	29.8
Williams (six months)	32	1	62.5
Tulare County (six months)	1,482	5	6.7
Crescent City (six months)	85	1	23.5

REMARKS.—Similar statistics for other towns have been received, but they are so clearly incorrect that they have been omitted.

Considering the whole State so far as reports of mortality have been received, we find the total number dying under five years of age, to have been, as above stated, 1,664, and the total number of children under five years of age, in the localities reporting, 32,196, the death-rate being 51.06 per 1,000 of infant population per annum.

This cannot be considered unfavorable. In Boston, according to the seventh annual report of the Board of Health, the death-rate in 1,000 children under five years of age was 95.6—27.6 larger than the highest death-rate shown above.

Yet, it cannot be denied that the showing made, viewed even in its most favorable light, cannot but make us feel how much is yet to be done to bring the death-rate of our cities down to that which is inevitable. Sixteen hundred and sixty-four deaths among infants not yet five years old—one in 3.9 of the total deaths; and one in 4.8 of these by preventable disease!

Perhaps it is too much to hope that the time will ever come when deaths by preventable disease will be among the things of the past, because it is probable it will never happen that the laws of hygiene will be so strictly obeyed in our persons, our homes, our surroundings, and our mode of living, as to altogether remove the causes by which they are produced; but may we not reasonably anticipate that, in the near future, when the efforts being made by this Board have produced their legitimate results, it shall no longer be said that of the children born in California, one in nineteen die annually of diseases which we were too ignorant or too negligent to prevent.

## HOSPITALS.

The following reports have been received from the hospitals and other public charitable institutions of the State. It is to be regretted that the list is not more complete, but though the usual blanks have been sent to all, and circulars addressed to the physicians in attendance urging a prompt response, only seventeen have been heard from. Possibly the failure on the part of some to send in the returns may be due to the imperfect arrangements which have up to this time been made for the accommodation of the indigent sick in some of the counties, and the very inconsiderable number of patients provided for and who had received attendance. The importance of having a full record of the inmates of our public hospitals, and of the diseases met with, is not to be overlooked. The class of maladies treated, the death rate, the provisions made for the care of the sick, the cost of maintenance, are all subjects of interest which should properly be embodied in the report of the State Board of Health. Yet the omission of a few counties materially mars the completeness of the record. Just at the present time, in view of the probable agitation in the Legislature of the subject of a State hospital for consumptives, and the duty imposed upon certain members of the State Board of Health to report upon the necessity of such an institution, it is important to know the number of patients suffering from this disease who have been treated in the several counties as a public charge, and the portions of the State to which they most frequently resort. Other interesting facts relating to this subject might easily be ascertained by the hospital authorities, such as the nativity of such patients, their occupations, their family history, the length of time they had resided in this State, their state of health on arrival here, and the portion of the State in which they had previously resided. Information on some of these topics has been sought in vain, yet there are few subjects upon which it is just now more essential to receive information, or which more intimately concern the interest of the State and its reputation as a resort for the victims of pulmonary disease from other States. That California has suffered in its claim to be a health resort for consumptives, in consequence of the looseness with which the statistics of the disease have been kept in our public hospitals, the failure to obtain and report a history of the cases applying for treatment, especially as regards their nativity, the duration of the disease, and its stage at the time of admission, there can be no doubt. Only facts are needed to establish the truth in this matter, and these facts, in the absence of an institution designed especially for the reception of this class of patients, can nowhere be so well collected as at the door of our County Hospitals.

Of seventeen hospitals reporting to the State Board of Health, seventy-two cases of consumption have been returned as among the admissions, and sixty-seven deaths. In some instances the deaths alone have been reported, rendering it impossible to determine the ratio of the latter to the cases under treatment.

The following tables will explain themselves. It is to be regretted that the City and County Hospital of San Francisco could not have been added to the number reporting; but we learn from the Resident Physician that two hundred and ten cases of consumption were admitted during the year.

## REPORT

*To the State Board of Health of the Indigent Sick treated in the following Hospitals.*

NAME OF HOSPITAL.	Number of Months Reported	Total admitted and in Hospital.	Discharged Cured	Discharged	Died	Per cent. of Deaths	Remaining under Treatment	Period included in Report.	Name and Residence of Physician.
Sonoma County Hospital	12	212	141	174	16	7.55	20	Twelve months ending June 30, 1880	J. B. Gordon, M. D., Santa Rosa, California.
Tulare County Hospital	12	60	42	12	6	10.	10	Twelve months ending June 30, 1880	A. E. Hall, M. D., Visalia, California.
Fresno County Hospital	12	70	46	57	8	11.4	5	Twelve months ending June 30, 1880	Lewis Leach, M. D., Fresno, California.
Sierra County Hospital	12	44	21	31	none.		13	Twelve months ending June 30, 1880	Alenby Jump, M. D., Downieville, California.
Yolo County Hospital	12	90	55	19	10	9	11	Twelve months ending June 30, 1880	Thomas Ross, M. D., Woodland, California.
San Luis Obispo County Hospital	12	43	31	33	9	20.9	7	Twelve months ending June 30, 1880	R. Parkhurst, M. D., San Luis Obispo, California.
San Joaquin County Hospital	3	54	40	47	10	18.	127	Three months ending June 30, 1880	A. T. Hudson, M. D., Stockton, California.
Del Norte County Hospital	12	11	7	1	1	10.	2	Three months ending June 30, 1880	F. Knox, M. D., Crescent City, California.
Central Pacific Railroad Hospital	12	2,219	2,174	13	7	0.32	25	Three months ending June 30, 1880	A. B. Nixon, M. D., Sacramento, California.
Kern County Hospital	12	105	162	13	13	12.3	19	Three months ending June 30, 1880	L. S. Rogers, M. D., Bakersfield, California.
Shasta County Hospital	12	66	33	12	6	9.09	15	Three months ending June 30, 1880	J. M. Briceland, M. D., Shasta, California.
Nevada County Hospital	12	190	72	59	12	6.3	52	Three months ending June 30, 1880	R. M. Hunt, M. D., Nevada City, California.
San Diego County Hospital	9	19	8	12	4	.047	3	Nine months ending June 30, 1880	C. M. Penn, M. D., San Diego, California.
State Woman's Hospital	12	788			3			Nine months ending June 30, 1880	John Scott, M. D., San Francisco, California.
State Asylum for the Insane	12	114	40	40	72	*5.8	1,116	Nine months ending June 30, 1880	G. A. Shurtleff, M. D., Stockton, California.
Sacramento County Hospital	8	500	200	514	51		97	Eight months ending June 30, 1880	J. R. Laine, M. D., Sacramento, California.
Napa State Asylum for the Insane	12	572	189	352	91	7.08	830	Twelve months ending June 30, 1880	E. T. Wilkins, M. D., Napa City, California.

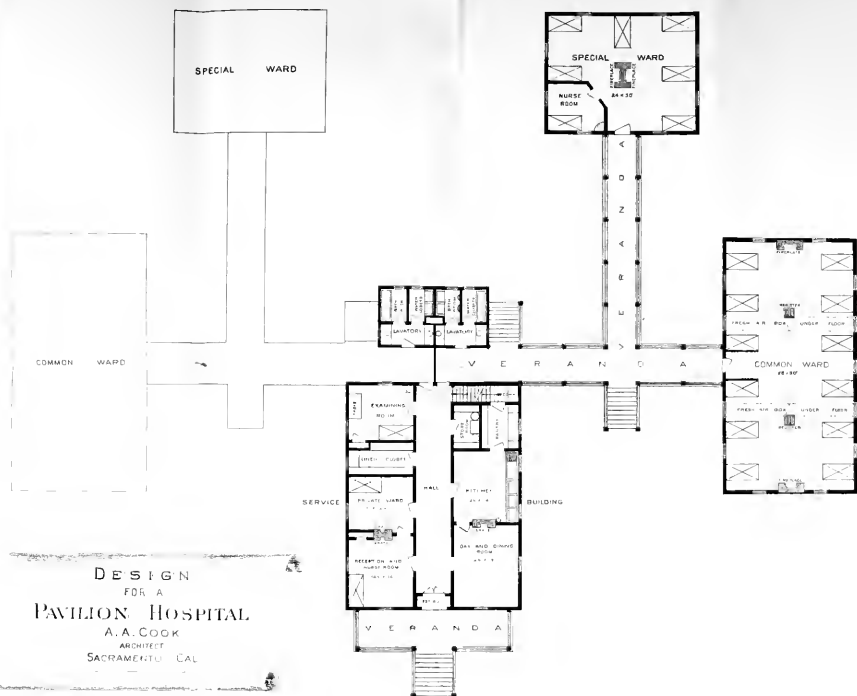
\* On whole number treated.

## Principal Diseases reported from Hospitals.

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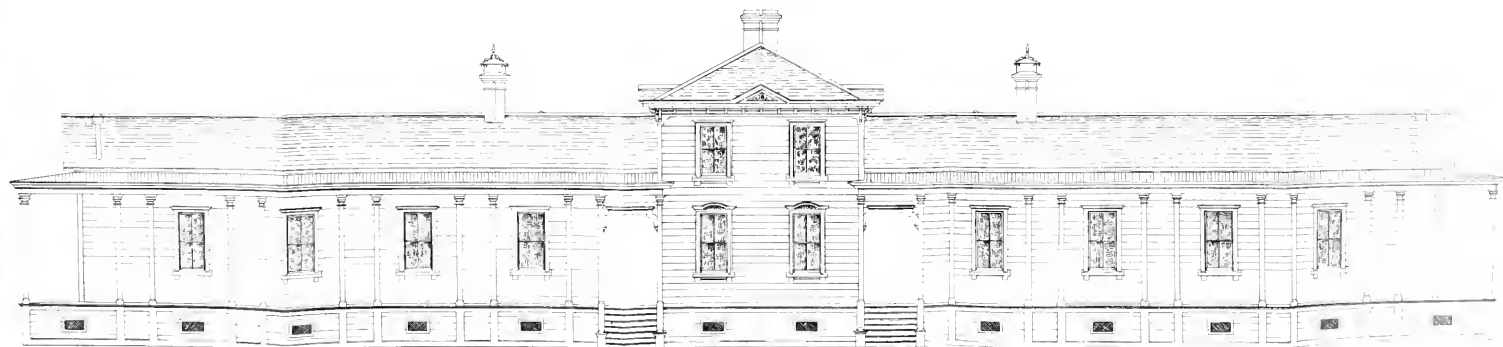
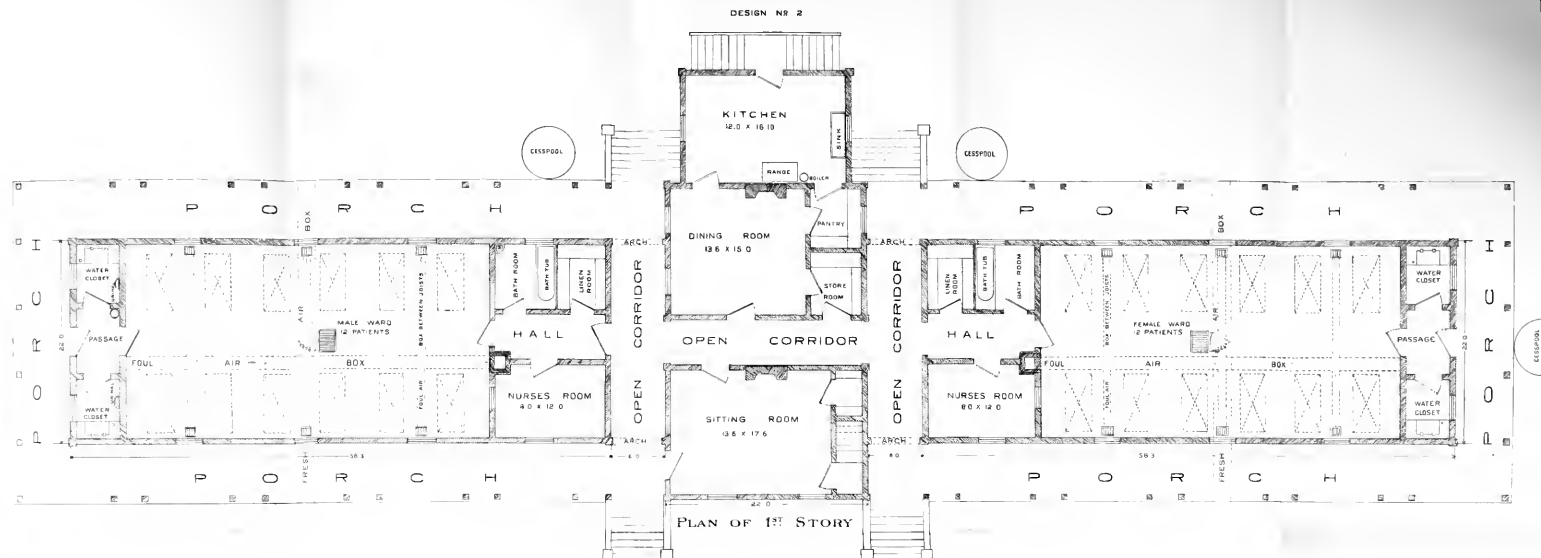
## REFERENCES

TABLE 1. Seasonal pattern of health of deaths in the following: The patients



DESIGN  
FOR A  
PAVILION HOSPITAL  
A. A. COOK  
ARCHITECT  
SACRAMENTO, CAL.





F R O N T   E L E V A T I O N





The following remarks, accompanying the reports from a number of the hospitals, will serve further to explain their condition.

From the Yolo County Hospital, Dr. Ross writes:

There has been no alteration in location, sewerage, supplies, etc., since my last report.

The percentage of deaths is increased, on account of four patients being admitted in a moribund condition—one case of pneumonia dying two hours after admission, and one case of pneumonia, one of alcoholism, and one of consumption dying within two days after admission. Respectfully, yours,

THOS. ROSS.

September 24th, 1880.

Dr. Knox, of Del Norte, furnishes the following:

The condition of the hospital is good. It is located on elevated ground, surrounded by fruit and shade trees, with good drainage; no sewerage; ventilation perfect; supplies plentiful and good. Medical attendance rendered by me daily, when needed. Surface area to each patient consists of one good sized private room, with the use of sitting and dining room, together with several acres around the house. The house has been occupied twelve or fifteen years, as a family residence, and about four years as County Hospital. There is a well of good and abundant water on the premises.

Dr. Fenn, of San Diego, reports the following:

The Franklin House, on K street, near the bay, has been temporarily devoted to hospital uses. Sewerage is on surface of ground, and sufficient. Ventilation ample, in the matter of doors and windows. Supplies furnished by a contractor, for the year; medical attendance and medicines, by Supervisors. Surface area not estimated, but large for present number. The building has been occupied as a hospital for nine months. Water supply, from City Waterworks.

Our Supervisors have purchased a tract of land in the Mission Valley, and contemplate the creation of a poor-farm in the near future. It is yet undecided whether all of the indigent sick will be provided for in this way, or whether they will erect a hospital building also in the city.

We have the following, from Dr. Gordon, of Sonoma County:

Phthisis, syphilis, rheumatism, paralysis, and cancer find a good field here, and of late we are beginning to have pure and undefiled intermittent fevers originating in this valley, but the large majority of admissions with fever are persons who have been in the Sacramento or San Joaquin Valleys, during harvest, and return here with fevers. I do not report the County Farm, as it is not immediately connected with the hospital, and yet it fairly belongs to this report, since I have brought to the hospital the dangerously ill from that institution. There are thirty inmates at the farm. Deaths from the farm are reported as from the hospital.

Explanatory remarks from Dr. John Scott of the State Woman's Hospital:

A large number of patients come for treatment who are not inmates of the hospital, as we confine the beds to those in need of immediate care. In the diagnosis of disease only the most prominent feature is noted, but *one diagnosis* is given, though the same patient, for instance, may be suffering from lacerated perineum, prolapsus—lacerated cervix, and sub-involution. The most salient features of the case are noted.

The statistics regarding location, drainage, etc., are in the last report. Inclosed please find last annual report.

Dr. Parkhurst, physician of the San Luis Obispo Hospital, sends the following communication:

SAN LUIS OBISPO, September 20th, 1880.

DEAR SIR: I send with this report a rough diagram of our hospital. It is finely located, one mile from the city, on elevated ground, having a commanding view for miles in every direction, is in fine condition, well cared for, sewerage good, well ventilated, well supplied with everything for the comfort of the patients; medical attendance daily. Length of time occupied, about two years.

The main building in front is thirty-six by thirty-six feet, two stories, twelve feet ceilings. Everything about the premises is in splendid condition. Supervisors and Grand Jury speak highly in its praise.

We have been favored by Dr. G. A. Shurtleff, the able Superintendent of the State Asylum for the Insane, at Stockton, with the following statement:

The location of the State Asylum for the Insane, at Stockton, is within the limits of said city, its grounds extending from Park street to North street, north and south, and from California street to Sacramento street, east and west, embracing one hundred and seven acres of land.

There is sufficient fall for the drainage of the rain, or surface water, in the natural incline of the land, and sufficient for sewage drainage by extending pipes to the permanent watercourses, or into the tule marsh on the west.

The sewage at present is taken away from the buildings in pipes, supplied with a flow of clear water, and connecting outside with extended wooden conduits; but it is desirable and in contemplation to have the sewage carried in pipes to tide water, which has been delayed in the expectation that the city would institute some general plan of sewerage with which the asylum might connect.

Ventilation in the principal buildings is good.

The supplies of food, clothing, and fuel are ample.

A corps of three physicians, denominated a Medical Superintendent, and Assistant Physicians, are required and maintained by law, for the medical care and treatment of the patients.

In the female department, the standard accommodations, as to room, are not less than an area of eighty square feet of floor or surface, to each bed or person, exclusive of corridors, dining rooms, water-closets, bath-rooms, lavatories, and clothes rooms.

The two detached wards in the male department, called mad-houses, so long complained of as below any modern standard of accommodations, are *condemned*; and a new building of a character fully suitable for the purpose, and in accordance with modern style and improvements, is being constructed for the patients in these condemned wards, and like classes of patients.

The water supply of the institution is good, both as to quantity and the quality of the water.

The institution has been occupied exclusively as a hospital and asylum for the insane since July first, eighteen hundred and fifty-three—a period of twenty-seven years.

Dr. Jump, of the Sierra County Hospital, writes:

Drainage and sewerage complete. Water supplied from spring coming out of slate rock, and passing through lead pipe three hundred yards. House, twenty-eight by twenty, two stories and basement, which is used for kitchen and dining-room. We have sometimes as high as eighteen patients—then each patient has about thirty-six square feet of surface. Supplies furnished on bids. Physician has full control under the Board of Supervisors; can dismiss and hire employes to suit himself.

Dr. L. Rogers, of Kern County, furnishes this information:

Location of hospital—southwest of Bakersfield, one half mile. It stands by itself, one eighth of a mile from other buildings. Has ample ventilation. Water supplied by a good well. Patients boarded and cared for by contract. We have room for thirty beds.

Dr. A. T. Hudson, in charge of the San Joaquin County Hospital, thus explains the situation, capacity, and drainage of the institution under his charge:

The San Joaquin County Hospital is chiefly a new building, erected last year. It is situated at the southeast part of the City of Stockton, just outside of the city boundary, and one mile from the Court House. It has a capacity for one hundred and thirty-five beds, and is well ventilated. It is supplied with pure soft water from a well one hundred feet in depth, and pumped by a hot-air engine, which fills a tank on the top of the building holding fourteen thousand gallons. The drainage is made perfect by flushing everything through large pipes into a cesspool situated on an adjoining vegetable and fruit garden, where it is all utilized as fertilizers. It is managed by one medical man, who is elected by the Supervisors every year, and one hospital Steward, who resides on the grounds in a small cottage apart from the main building. There are thirty acres of good land belonging to the establishment, on which hay and vegetables are produced to supply a large part of what is needed for all the inmates, and to feed the cows that supply all the milk required.

I am indebted to Dr. Laine for this description of the commodious and well arranged hospital under his charge in Sacramento County:

This hospital is situated on the upper Stockton road, two and a half miles from the center of the City of Sacramento. The buildings are located on the site of the old hospital, burned in the fall of eighteen hundred and seventy-eight, which is on a tract of land comprising fifty-seven acres, known as the County Farm. The hospital is built on what is known as the pavilion plan. The main building of three stories, comprising office, library, dining-rooms, physicians rooms and dormitory, is connected by covered walks from the first and second floors, to five two-story buildings, each having an upper and a lower ward. The hospital is heated by steam, and lighted by gasoline, while an inexhaustible supply of excellent water is obtained from a well at a depth of twenty-eight feet. The water is elevated by a steam pump, into a tank having a capacity of twenty thousand gallons, at a height of eighty-five feet, which furnishes ample pressure for all practical requirements. The ventilation of the different buildings is quite complete. In the rear of each ward are marble-topped lavatories, and the patent water closets are ventilated by Cottier's method; each ward also has two bath tubs, with an ample supply of hot and cold water. All the drains from the hospital buildings, laundry and dead-house, flow into a sewer having a gradual fall, and emptying into a cesspool one half mile south. The supplies for the hospital are obtained by quarterly contracts let to the lowest bidder on the advertised list, and have been furnished in liberal quantities and of good quality. Each ward is seventy-seven feet in length, twenty-three and one fourth feet in width, and sixteen feet high, and being designed for twenty beds, have an air space of one thousand four hundred and thirty-two cubic feet per man. The medical attendance has been that of the County Physician and Hospital Superintendent, Dr. Joseph R. Laine.

Dr. Briceland, in charge of the Shasta County Hospital, thus explains the condition of the institution :

Shasta County Hospital is located three quarters of a mile from the Town of Shasta, on an elevated plat, with excellent drainage in all directions from the buildings. There are three (3) separate buildings, with capacity for comfortably accommodating thirty-five patients. Ventilation good; water supply, full and pure. There is one Steward, who resides at the institution, and one medical attendant.

At the close of the Summer months, and early Fall months, the hospital is crowded with patients from other parts of the State. At the present date there are twenty-nine patients being cared for. Many of these are tramps. Time occupied in cases of fevers, from fifteen to forty days. Several of the inmates have been residing in the hospital for years—incurable and helpless.

The report from the Napa Asylum for the Insane is accompanied by the following remarks :

The Napa State Asylum for the Insane is located on a tract of two hundred and eight acres of land, a little less than two miles southeast of Napa City. It is situated on a plateau of land, elevated about forty feet above tide water, which covers the low lands of the tract. The sewerage facilities are therefore excellent, and have been availed of to the fullest extent. The small sewers are said to be made of the best quality of hydraulic cement, carefully laid to a line, and of sufficient fall; the joints being put together with fine cement mortar, and made perfectly water-tight. They vary in size from six to fourteen inches in diameter, being regulated by the quantity of soil calculated to pass through them. The soil pipes empty into these sewers, and they into the main sewer, which commences on the south side of the main central entrance, and continues down to the ravine on the south side of the asylum property. It is eight hundred feet in length, egg shaped in section, four feet high, and two feet six inches in the widest part. The wall is eight inches thick all round, built with the best quality of hard burnt brick, well bedded in cement mortar, and laid throughout with a current of at least three inches in ten feet. From the end of the main sewer, the sewage is conveyed in pipes underground a thousand feet further, where it is turned upon the garden land, and finally finds its way into tide water.

The asylum faces the west and consists of a center building with wings extending on each side, which are exactly alike—the divisions for the sexes being equal—twelve wards on each side, exclusive of one ward on the fourth floor of the center building and one in the attic over the same, the two being occupied by one hundred male patients. The style of the architecture is domestic gothic, being the best adapted to the site; and with its numerous projections and towers; the hills and trees in the background; the tastily laid out grounds in front, dotted with arbors and shrubs, and adorned with flower beds, and approached by a broad and spacious avenue, which is lined by three rows of trees on either side, gives a very attractive and pleasing effect to the whole. The natural ventilation of the hospital is all that could be desired, every room having a large window communicating with the outside air. The ventilation of the closets, however, is defective, and can and should be remedied. The soil pipes should be continued through the roof above, and ventilating shafts constructed to convey the foul air from every closet, urinal, and bath room in the asylum. This can easily be done at a comparatively small expense, and it is confidently believed the next Legislature will make the necessary appropriation to make this improvement. The water is remarkably good and free from impurities, as will be seen from the following analysis by Professor Hanks:

"I find this water to be remarkably free from impurities, as the following statement will show:

"The water is transparent, free from color, containing but a small quantity of suspended matter, which quickly subsides when the water is allowed to stand; it is very slightly alkaline, and a portion of the fixed ingredients is in the state of bicarbonates.

"A microscopic examination shows the suspended matter to be principally vegetable, and the forms revealed are those common in good water when it is allowed to stand for a time in reservoirs or tanks.

"The total fixed constituents in this water were found to be 11.08 grains in one United States wine gallon, which is equal to 13.3 grains in one imperial gallon, 0.190 grammes to the litre, and to 19.0 parts in 100,000.

"The hardness is equal to 3.7 grains of carbonate of lime in an imperial gallon, or 5.29 parts in 100,000. From organic matter, both in the form of ammonia and albuminoid matter, it is singularly free, showing only traces.

"The constituents found, and which it was thought necessary to determine quantitatively, are as follows: Carbonic acid, chlorine, phosphoric acid (trace), boracic acid (trace), iron, lime, silica, soda, and magnesia.

"As the result of my examination I have no hesitation in pronouncing this water to be good and in every way fitted for domestic use. It is remarkably soft, free from sulphate of lime, contains only a small quantity of fixed ingredients, and is free from mechanical impurities, which properties render it in every way suitable for manufacturing purposes.

[SEAL.]

"HENRY G. HANKS."

It is greatly to be regretted, however, that the quantity is entirely insufficient for irrigating purposes; and until the supply shall be increased by the construction of a reservoir, no green lawns can adorn the otherwise beautiful grounds of the asylum. There is upon one of the tracts of land belonging to the State a splendid place to construct a dam, and make a reservoir that would furnish all the water that could be desired; and with its aid this can certainly be made one of the most attractive and beautiful places in the State. Let us hope it will not be long ere this coveted boon will be granted to this institution.

The prevailing winds are from the southwest, and as they sweep over the bay, in their passage from the sea, they come to us pure and fresh, being strongest in the afternoon.

The accompanying table, prepared by our apothecary, Mr. George R. Walden, will give the best idea of the climate and temperature.

The small percentage of deaths, considering the class of patients and character of diseases treated, the total absence of epidemics, and the almost perfect freedom from malarious diseases, attest the salubrity of the climate and the healthfulness of the location. Indeed, when it is considered that among the employes, the officers, and their families, in all comprising about one hundred persons, there has been but little sickness, and no death, during the year, it is remarkably healthy.

*Highest, lowest, and average temperatures at the Napa State Insane Asylum, of each month, for the fiscal year ending July 1st, 1880.*

THERMOMETER.	July.	August.	September.	October.	November.	December.
Highest.....	82	96	86	87	65	65
Lowest.....	48	48	47	40	35	26
Average of maximum.....	75.09	77.03	77.06	74.80	59.70	49.90
Average of minimum.....	52.96	52.87	49.76	46.61	41.30	35.80

THERMOMETER.	January.	February.	March.	April.	May.	June.
Highest.....	60	62	66	73	89	86
Lowest.....	27	29	29	38	37	43
Average of maximum.....	50.29	53.89	57.25	58.76	69.29	73.66
Average of minimum.....	33.80	38.20	38.58	45.26	49.03	49.96

Many of our County Hospitals are but poorly adapted to the purpose. In a number of cases, buildings erected for other uses have been converted into places for the reception of the sick, sometimes with more or less remodeling, but often without any architectural change. The county authorities are not altogether to blame in this matter. Many of the counties are thinly settled, the burden of taxation required for the support of the local government is already severe, the cases demanding admission to a hospital are but few, and these are generally chronic cases or the result of accidents; there are very few zymotic or infectious diseases under treatment, and there are seldom more than three or four patients at any one time. Under such circumstances, the expense attendant upon the erection of a proper hospital building, and making provision for its systematic management, has doubtless seemed to the authorities to be scarcely justified by any pressing necessity, however desirous they may be to do their full duty by the sick and unfortunate. As the population of the counties increases, this defect will be corrected, and it is gratifying to note that some progress has been made in this direction during the past year. Some of the hospital buildings have been improved, and applications have been made to this office from other quarters for plans for buildings in accordance with modern models. To supply this want hereafter, I have obtained from an architect having much experience in hospital construction and the best methods for heating and ventilation, Mr. A. A. Cook, of Sacramento, certain drawings representing different styles of buildings suitable for our country towns. They are all on the "pavilion plan," and represent the received ideas of the best hygienists as to cubic air space, floor space, ventilation, warming, and drainage. They are designed for cheap structures, within the means of almost any county, and can be enlarged from the present plans if desired. There can be no question about the superiority of light pavilion hospitals over the complicated and many storied buildings formerly constructed, both in an economical and sanitary point of view. They are less expensive, they are more convenient, more easily ventilated, involve less risk from fire, and being cheap, their destruction, if per chance, as all hospitals used for infectious diseases are more or less liable, they become contaminated by infectious germs, can be accomplished with comparatively little loss.

The building designed in Plan No. 1 can be erected as a whole, abridged or enlarged, as shown in the cut, without changing the architectural arrangement. The small ward, or building in the rear, is intended to be used as a cottage hospital or "hut," as it is sometimes designated, for special cases, requiring isolation from the general ward. It may be enlarged or diminished in size and capacity, according to circumstances. It is to be of one story, except the "service building," which will have two stories. This second story will contain four dormitories, one private ward, bath-room, water-closet, wash-basin, and four small closets; or it may be differently divided to suit the fancy of the authorities or the convenience of the locality.

The ventilation of this hospital is intended to be similar to that described for "Design No. 2," except that the chimneys are to take the place of the foul-air shafts. There is also a slight variation in the roof ventilation. The system of ventilation adopted is in accordance with the views of the best authorities, and, with the roof ventilation, leaves little to be desired.

## ESTIMATE OF COST OF PAVILION HOSPITAL. DESIGN No. 1.

Service building, with water-closets, bath-room, and lavatory -----	\$2,600 00
One common ward -----	1,700 00
One special ward -----	1,120 00
Total -----	\$5,420 00
One common ward and one special ward added -----	2,820 00
Service building and four wards complete -----	\$8,240 00

Few of our interior counties would require, probably for some time to come, more than the "service building," with one "common," and one "special" ward. Others might be added as occasion requires.

Design No. 2 represents another hospital on the pavilion plan, with the method of heating, ventilating, etc. The main, or *service*, building is to be two stories in height; the wards, one story. If preferred, on account of the expense, or because of the small number of patients likely to be received, one of the wards may be left off until future necessity requires an additional number of beds.

The following extract from the specifications, written by the architect, Mr. Cook, will better explain the ventilation:

"There will be one *fresh-air* box under the floor in each ward building, as shown on drawings, and to be 18 inches by 2 feet 6 inches wide, made of dry, dressed, and matched redwood, not over 4 inches wide, and put together in lead paint; to be a batten door, hung in the center, to swing both ways and stop against a cross box, which will turn air into the ward room through the register in the floor. The register will be 20x24 inches, made with cast-iron swivel-blind registers, which can be opened and closed. The outer ends of the fresh-air box are to connect with the lattice openings under the porches.

"There will be one *foul-air* box under the floor, as shown on the plan, which will be 12x18 inches, made of the same materials and in the same manner as the fresh-air box, and to extend the entire length of the ward room, and connect into the chimney flue. The cross boxes will be made between the floor joists, by nailing a board on the under side of the joists, and connect in the center with the large boxes that extend into the chimney flues; and there will be open registers, 8x8 inches, between the floor joists, as shown on the plan.

"The swinging door of the central register will regulate the amount of fresh air admitted."

There are designed to be 8-inch galvanized iron pipes running up through the ceiling and roof over the bath-rooms and water-closets, each to be capped with the "Emerson" ejecting cap. The soil pipes from the water-closets and sinks are to be efficiently ventilated, by their extension above the roof.

The estimated cost of such a hospital, completed, as in the drawing, at Sacramento, is about \$6,000.

The rooms in the upper story of the "service building" may be arranged as suggested for "Design No. 1," or in any other manner which may be thought convenient.

## REGISTRATION.

The subject of an efficient system of registration of deaths, births, and marriages has been urged in every report of the Secretary of the State Board of Health. A bill relating to this important yet difficult matter was passed by the Legislature three years ago, but, as stated in the last report, it proved quite deficient. It was not obeyed by a majority of the County Recorders, whose duty it was to distribute the blanks sent to them to the physicians in their respective counties, nor was the provision, requiring physicians, midwives, undertakers, and others to report to the Recorders, very generally observed. The result has been that only a few counties have been heard from, and in a majority of these the reports have been manifestly imperfect;

the complaint, and the reason assigned for their incompleteness, being the difficulty in obtaining the necessary information from those whose duty it is to give it. The subject was again brought before the Legislature, at its last session, in the form of an amendatory bill, which, after having been referred to the Judiciary Committee of the Senate, was said to contain a provision contrary to the law; this was embraced in the section authorizing the payment of a small fee to all the County Recorders for the extra labors which were imposed upon them. Many of these officers being salaried officers, required to pay all fees into the county treasury, there was thought to be no way in which the section referred to could be made practicable.

As an experiment, the School Census Marshal for Sacramento, when about to enter upon his duties in June last, kindly consented to canvass the number of births in the city for the preceding year. The result gave us 356 living births, with the sexes. There is no method known by which the accuracy of this enumeration can be certainly determined. The number returned exceeds that published in the Record-Union for the corresponding period by 139; yet we have generally supposed that a much larger proportion of the births found their way into that paper. Estimating the total population, living in the middle of the year, to have been 21,500 (the number given by the United States census), and the total number of living births in the year to have been as above stated, we obtain a birth rate of 16.5 per 1,000, or, including stillbirths, 17.4 per 1,000; while the death rate has been shown to be 29.7 per 1,000. The birth rate in European countries is given at from 26 to 37 per 1,000. Yet this is the nearest approximation that can be obtained. It is said by the Marshal to be exact, according to the representations made to him.

Cannot this method of enumeration be extended to the entire State? It is known that a school census is taken each year, embracing all children from birth to seventeen years of age, and the labor of filling up the additional columns required for the registration of births, with the sexes and parentage, would probably be acceptably compensated for by a moderate per capita. The inducement would then be offered of obtaining full returns. The method might be extended so as to include the deaths in town and country districts, having no local registration system. The principal difficulty would be in probable errors as to the causes of deaths.

I respectfully present this subject for your consideration. As subjects possessing a more or less intimate relation to the sanitary condition and resources of the State, I have prepared special reports upon the "Mineral Springs of California," and upon the "Sanitary Condition of the City of Sacramento."

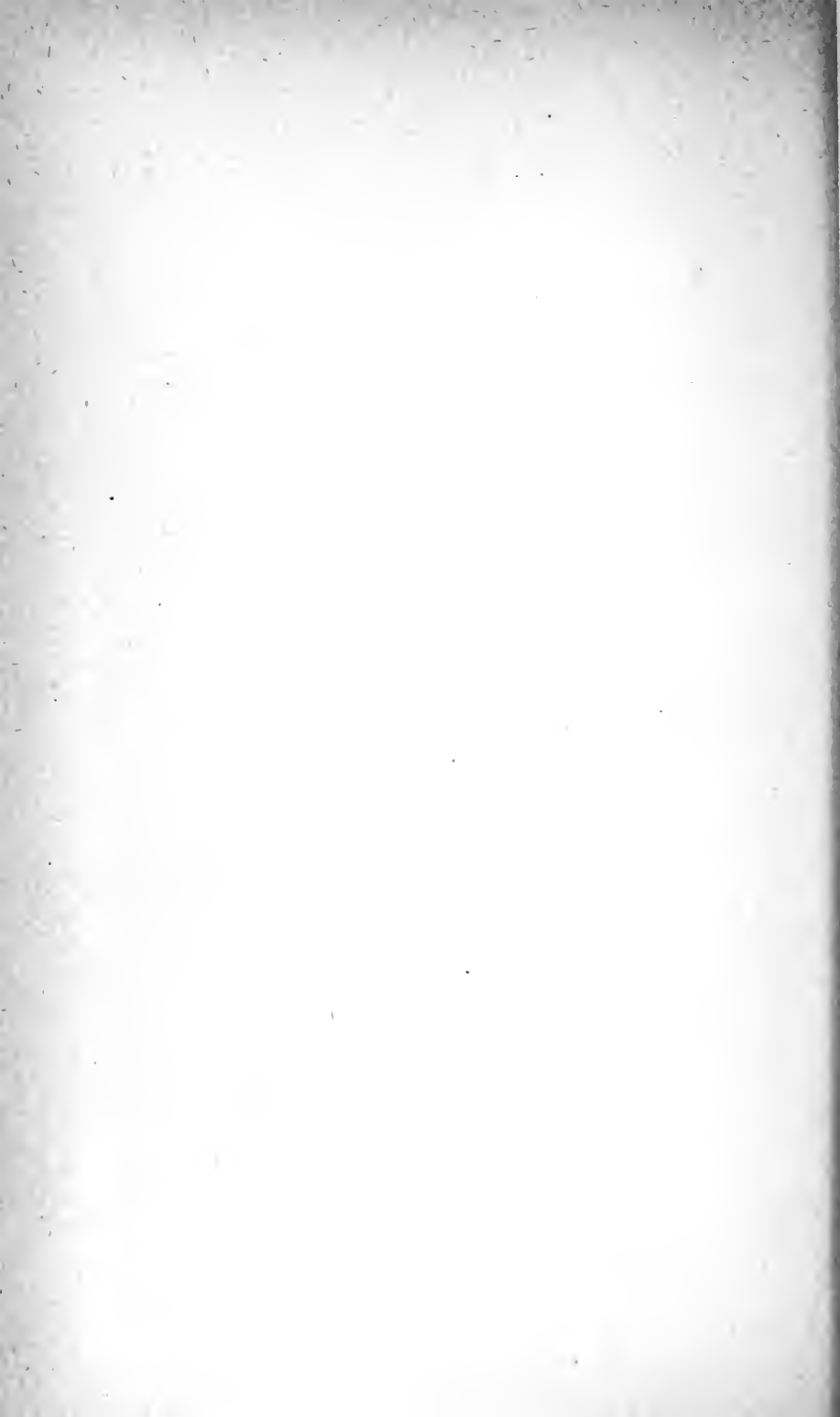
Your attention is respectfully called to the suggestions made in the former, with the view of obtaining reliable analyses of the more prominent of our mineral waters.

Respectfully submitted.

F. W. HATCH, M. D.,  
Permanent Secretary State Board of Health.

SACRAMENTO, California, October, 1880.

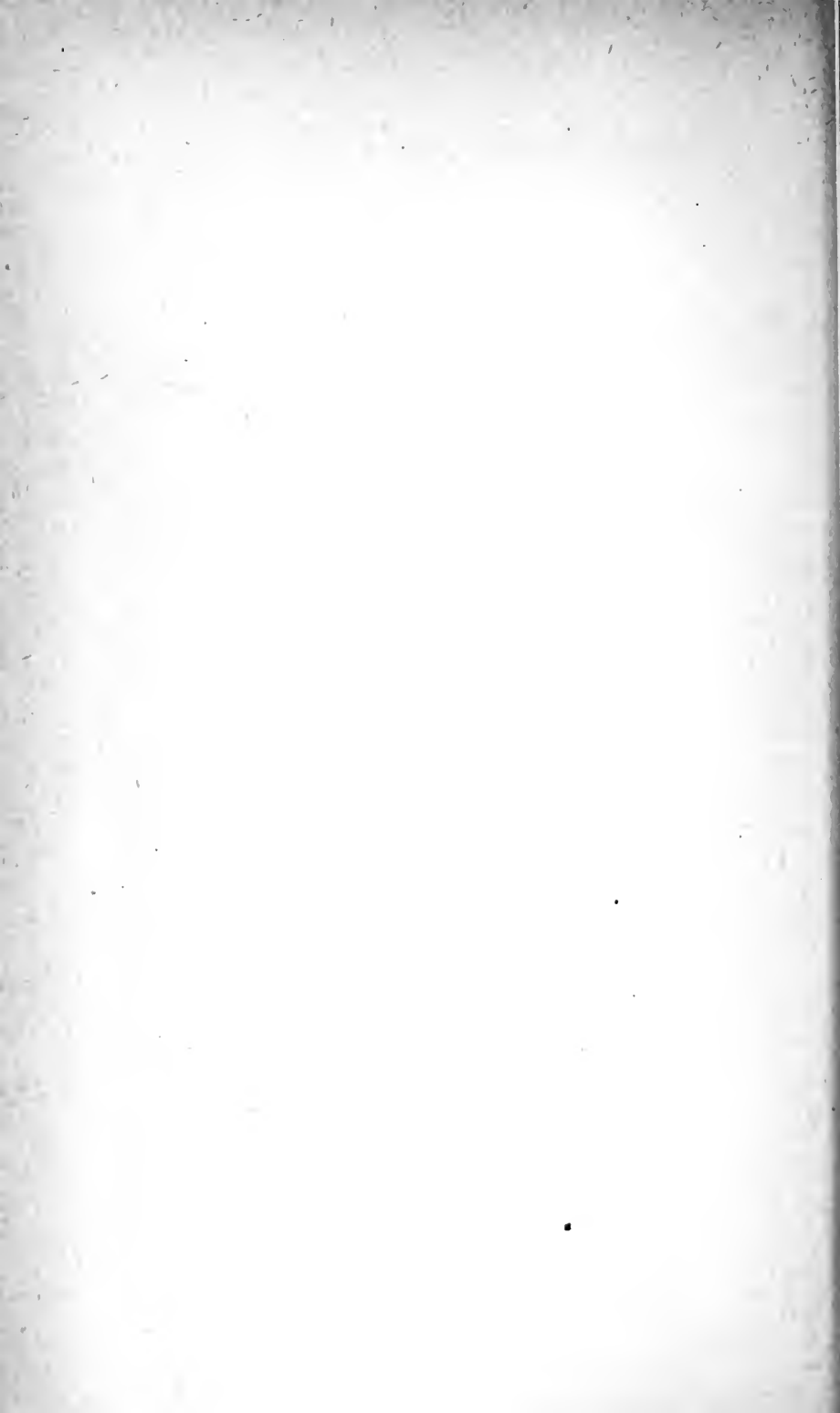




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# APPENDIX.

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# THE MINERAL SPRINGS OF CALIFORNIA.

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BY F. W. HATCH, M. D.

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The subject of the mineral springs of California is one of increasing interest and importance, a fact due not only to the great number which have been discovered and introduced to the favor and patronage of the public, but to the intrinsic value, now well established, of many of them. In eighteen hundred and sixty-two, an attempt was made by the writer to classify the medicinal springs then sufficiently known to warrant examination, in a paper read before the State Medical Society of California. Many of them were personally visited, the important facts relating to them sought to be ascertained, and analysis, wherever obtainable, reported. In eighteen hundred and seventy-one, Dr. T. M. Logan, then Permanent Secretary of the State Board of Health, resumed the subject in a somewhat elaborate report to the State Board of Health, extending his investigation into the history and medicinal value of other springs then lately discovered, or concerning which authentic information had been recently obtained. Still later, John S. Hittell, Esq., has presented us with a valuable resumé of what was authentically known concerning the more important of our mineral springs, comparing them with others of world-wide celebrity in Europe. Since then new discoveries have been made, further analyses have been prepared, springs, long since discovered, but about which little was known, have been studied in their therapeutic character and value, and further facts have been established touching the curative action of many of these agents.

Yet, even now the greatest uncertainty prevails as to the value of our mineral waters in disease, due in a measure, perhaps, mainly to the haphazard manner in which they are employed, the want of discrimination in their selection, and their consequent frequent failure to afford anticipated relief.

A gross misconception prevails as to the true character of mineral waters, their relation to medicine, their power for evil. Many who would tremble at the idea of taking medicine of their own volition, or as the prescription of a non-professional friend, do not hesitate to rush to the "springs," and apply themselves assiduously to their use upon the testimony of others who, perhaps, under different circumstances, and with altogether different diseases, had been benefited thereby. The important fact is forgotten, or not realized, that an agent sufficiently active in its influence upon the human system to do great good, to eradicate grave diseases, is also capable, misapplied, of effecting harm. They fail to associate the idea of an inert water with the potent constituents it may hold in solution, and, losing sight of the latter, they cannot appreciate the possibility of injury resulting from the former. Hence, of those who annually visit the watering places of the State, comparatively few do so under medical advice. It is not surprising that many, failing of benefit, suffer serious detriment by the experiment. Even with all the existing

knowledge of the constituents of mineral waters, and notwithstanding a tolerably exact understanding of the chemical and therapeutical effects of their different constituents, when considered singly, upon the human system, we know comparatively little with certainty of their action when combined by nature in the form of water; it is, to some extent, a matter of conjecture, or rather of inference, from what we know of each ingredient by itself; nor, indeed, can the chemist, however skillful in his analytical determinations, assume the correctness of the combinations worked out in the laboratory. Practically, therefore, the history of our mineral waters, as derived from an actual knowledge of their effects upon disease—intelligent observation of the results of treatment with those afflicted with diseases properly diagnosed—would, if it could always be secured, furnish us a much more reliable guide in forming just conclusions of their value in any given case than the theoretical reasonings of the chemist. Such accurate information, in the early history of medicinal springs, is not always to be obtained; popular rumors, or even the reports of individuals upon their own experience—of cures effected in their own persons—are to be received with much suspicion, on account of probable diagnostic errors and the misinterpretation of symptoms. Fortunately, we have the experience derived from the mineral springs of Europe as a guide, which have become so well known as curative agents in various diseases that we are able, with a reasonable degree of accuracy, to associate their effect with certain known combinations of ingredients; and it is true that these effects in general correspond with what the *materia medica* teaches should be expected from the results of analysis. The same is true of many well known springs of other States in this country—notably, those of Virginia. The mineral waters of California bear a marked resemblance in their chemical composition with some of those of Europe and Virginia, and from a knowledge of the latter we may draw rational conclusions as to the remedial virtues of the former.

The subject of the treatment of disease by the use of medicated waters is of sufficient importance, therefore, to receive the attention of the physician; it is too intricate in its nature to be submitted to empirical decision; nor should it be left to the judgment of the patient, ignorant not only of the nature of the water, but oftentimes of the disease for which he seeks relief.

Various classifications of mineral waters have been made. The simplest is the best for present purposes. They are all based upon the predominance of some one or more principal ingredients. Hence, we have the alkaline waters, the distinguishing constituents being carbonates or bicarbonate of soda, potassa, lime, magnesia, etc., and containing considerable carbonic acid gas; the saline, most of them being aperient with the chlorides of sodium and magnesium, sulphates of soda, potassa, and magnesia, etc; sulphurous waters, characterized by the presence of sulphuretted hydrogen, in other respects being alkaline or saline, in accordance with the predominance of one or the other class of ingredients; and the chalybeate, containing a certain proportion of iron, in combination with substances belonging to one or another of the above classes. Then, again, we have the thermal waters, of different degrees of temperature, from seventy-five degrees to one hundred degrees, or even one hundred and forty degrees.

Waters of the ALKALINE class—known also as carbonated or acidulous waters—have been chiefly advised in certain affections of the stomach and intestines, catarrhal in character, in bronchial catarrh uncomplicated by cardiac disease, in gout, for the relief of which they have attained celebrity, in chronic rheumatism, in functional disturbances and engorgement of the liver, in catarrh of the bladder, in diabetes mellitus, and in dropsy. They are advised in the dyspepsia attended with excessive acidity of the secretions, “with sour or rancid eructations and regurgitations,” and flatulent distention of the abdomen.

Pure alkaline waters are seldom purgative, but, being usually associated with the salines, they may become so. They are often more properly alkalo-salines. They are commonly decidedly diuretic, and correct an acid condition of the urinary secretion. Hence, probably, their utility in rheumatism. For the chronic forms of this disease they are used internally or in warm baths, and are of decided efficacy.

The SALINE waters are aperient, diuretic, and excitant to the liver and its secretions, and to other members of the glandular system. They are, as above remarked, commonly associated with one of the other classes, and hence their medicinal effect will be accordingly modified. Many of them are thermal. They are used both internally and for bathing, and have been found efficient in various cutaneous diseases; in scrofula, and in gout and rheumatism. They have also been employed successfully in diabetes, and Bright's disease; in calculous concretions of the gall-duct, and in uterine engorgements.

Both of the above classes of mineral springs are frequently associated with iron in greater or less proportion, and hence are called CHALYBEATE waters whenever the iron is in sufficient quantity to become prominent. Chalybeate waters possess in a high degree the virtues of the ferruginous preparations, being in a form acceptable to the stomach, and which is readily introduced into the blood, improving its quality and effecting the gradual removal of those states of the system known as chlorosis and anæmia. They are of great benefit in disturbance of the functions of the uterus, characterized by amenorrhœa, when accompanied with a debilitated condition of the system, and also in excessive menstruation. Probably the improved hygienic conditions by which the patient is surrounded add greatly to the salutary effect of these waters.

SULPHUROUS Waters. The medicinal effects of these waters depend mainly upon the combination of sulphuretted hydrogen with the ingredients already described as composing the saline, alkaline, and chalybeate waters. They are admitted, however, by all authorities, to exert a sedative action peculiar to themselves, more or less marked according to the quantity of the sulphuretted hydrogen they contain. To the same substance is due, in part, their diuretic action. They have attained considerable reputation in chronic skin diseases, and in scrofula. For their curative virtue in chronic rheumatism they have very justly gained a great notoriety, but in such cases their efficacy seems to depend more upon their external use, in warm baths, than upon their internal administration. In paralysis without organic lesion they are of service, while in the same disease attended with cerebral or spinal apoplexy, they are regarded to be injurious. (Stillé.) “In engorgement of the liver, abdominal plethora, and hemorrhoids,

the saline-sulphur waters have long been justly esteemed as trustworthy remedies." (Walton.)

According to Dr. Thompson (Cycl. of Pract. Med.) they are injurious to those laboring under general plethora, or are affected with inflammatory fever.

In lead-poisoning they constitute a very valuable remedy, effectually eliminating the poison from the system.

They are also strongly advised, used internally and as baths, in cases of amenorrhœa or defective menstruation, and in chlorosis.

From what has now been said—which is but a general outline of the history of mineral springs and their uses—it may readily be understood that they are complex agents, varying according to their combination and temperature, and not to be used indiscriminately or ignorantly. That they are capable of doing great good has been abundantly demonstrated; that they may exert a power for evil, is not less certain; and these opposite effects may result not alone from the different kinds of water used, but also from the method of using it. For example, a saline or alkalo-saline water may be purgative or diuretic, almost at the pleasure of the person taking it. Large draughts taken before breakfast will probably produce an aperient effect; smaller ones at intervals during the day will be diuretic.

As to the quantity to be taken during the day, it may be stated, as a general rule, to be two or three glasses before breakfast, and as many during the day. It is better to pause, or even walk for a few minutes, between each glass. Mineral waters should not be used within an hour of the time of meals. When visiting the *Ætna Spring*, the writer was informed by visitors that a full draught of the water, taken soon after meals, invariably caused vomiting.

Small doses are often preferable to large ones. Except in the case of aperient waters, designed to regulate the bowels, a principal effect sought to be obtained is that resulting from the alterative action of the water—a slow modification of the system, a gradual stimulation of the organic processes—by which the secretory organs are improved and glandular obstructions removed. Thus, judiciously used, many of the waters may prove a valuable tonic, while taken with less caution the principal purposes of their administration may be thwarted. Ordinarily several weeks of treatment are required to fulfill the indications.

Mineral waters taken with all due care occasionally disagree, or they are strangely inefficient, or even do harm in cases apparently suited to their use.

In such instances competent medical advice is needed to correct the trouble, to regulate, increase, or diminish the quantity taken, or to change the time of taking it. As remarked by Moorman, of the mineral springs in Europe, "The advice of a competent physician who is well acquainted with the nature and peculiarities of the water is thought so important, that persons rarely enter upon their use without such advice; and at some places are actually not permitted to do so. If similar precautions were more commonly adopted by visitors at our various watering places, a far larger amount of good would be achieved to the afflicted, much injury prevented, and the character of the several waters better established and preserved."

The external use of mineral water is often more efficient in disease than its internal administration. It is attended, too, with greater risks. It may be cold, tepid, warm, or hot. Certain general rules have been laid down regulating the use of baths. They are better employed on an empty stomach, as in the morning, before breakfast, or at bedtime, or an hour before dinner. When two baths are used daily, as is the custom at many watering places, probably the best times are before breakfast and an hour before dinner; or, when it is desirable to promote perspiration, in the evening, the patient retiring to bed immediately. Cold baths should, as a general rule, not be of longer duration than five minutes; warm baths, fifteen minutes; hot baths, from five to fifteen minutes. "In some cases, especially when the bath is used for cutaneous diseases, the patient may profitably remain in for a much longer period, even from half an hour to one hour. As a general rule, and especially for delicate persons, active exercise should be avoided while in the bath; and always, on coming out, the bather should be well rubbed over the whole body with a coarse towel." (Moorman, Mineral Springs of the United States and Canada.)

Hot baths are decidedly stimulating in their action, increasing the force of the circulation, and exciting the heart. The author above quoted, justly regarded as high authority in the use of mineral baths, states that they are "potent and positive agents. When applied to the human body they are never negative in their influences, but will do either much good or much harm, according to the judgment and skill with which they are employed. \* \* \* They should never be prescribed merely for the name of a disease, however carefully its nomenclature has been selected. The precise existing state of the system, whatever may be the pathology of the disease, ought always to be carefully looked to before a course of hot bathing is directed."

Hot baths should never be used by persons having organic disease of the heart, or are the subjects of hemorrhage from the lungs, or of a plethoric condition, with tendency to cerebral congestion, as indicated by vertigo, or swimming in the head. Warm baths are likewise contra-indicated in such cases in proportion to their temperature.

Cold bathing, though considered tonic in its effect, should be avoided by those much debilitated, and in whom reaction is feeble or slow in coming on.

Consumptives, even in the early stage of disease, should keep away from these watering places. Many of them are well adapted by location and climate for persons of this class, it is true, and so far may be resorted to, but there is no fact in medicine, or in the history of consumption, more fully attested than that the treatment of that disease by mineral waters, especially the saline and alkaline waters, and their combinations, is positively hurtful. Yet every year the visitor to these springs will find many in all stages of phthisis among the most diligent and earnest subjects of the water treatment.

Perhaps sufficient has been said to demonstrate to the non-professional reader, for whose benefit the above remarks have been penned, not only the importance of mineral springs as a means of relief from certain diseases, but also their danger when injudiciously used. It is hoped that the necessity of discrimination in their employment, and of acting, in the use of so potent a remedy, under the direction of a



competent medical adviser, has been shown with sufficient clearness. Were these precautions generally observed, it is believed that a new impulse would be given to the treatment of disease by the means of mineral waters, more cures effected, fewer disappointments realized, and that the springs of California would soon assume their deserved position in public and professional estimation as equal to any in the world.

The following springs have been brought to the notice of the writer. Some of them have been personally visited and examined, and of others every reasonable effort has been made to obtain an authentic history.

## ALKALINE SPRINGS.

### CALIFORNIA SELTZER WATER.

This spring is located in Mendocino County, in the Coast mountains. It has an agreeable alkaline taste, is antacid, slightly diuretic, and, in large quantities, is laxative. An analysis in our possession gives the following result to each pint:

	Grains.
Free carbonic acid—abundance .....	
Bicarbonate of soda .....	6.65
Carbonate of lime .....	8.80
Carbonate of magnesia .....	5.65
Chloride of sodium .....	2.15
Carbonate of iron and siliceous acid—traces .....	
Total .....	23.33

The name of the author of the above analysis is not in the possession of the writer.

### ADAMS' SPRING.

It is located in the mountains of Lake County, about eight miles south of Clear Lake. Each gallon of water contains the following:

	Grains.
Carbonate of lime .....	28.714
Carbonate of magnesia .....	99.022
Carbonate of soda .....	57.036
Carbonate of iron .....	.517
Chloride of sodium .....	4.112
Silica .....	7.218
Organic matter .....	2.811
Salt of potash—traces .....	
Nitric acid—traces .....	
Total .....	199.430

Each gallon also contains three hundred and four cubic inches of free carbonic acid gas. We have not been able to visit this spring, but from its analysis, which is believed to be correct, we are disposed to regard it as possessing decided remedial virtue. It is already much frequented by visitors, and has attained a high reputation for the relief of the disorders to which this class of waters is especially suited. It has afforded marked relief in rheumatism, and is much esteemed by those who have used it for the correction of certain diseases of the stomach associated with deficient secretion of bile. It is also thought by many who have visited it to be useful in chronic metritis.

A number of cases of chronic Bright's disease, going from Sacramento, have been reported to me as having been much improved by the use of this water. It is said by all who drink it to have a strong taste of petroleum.

#### ALLEN SPRINGS, LAKE COUNTY.

Among the many springs with which Lake County abound these are regarded by those who know them best, as being among the most valuable. Their location is in a cañon near the head of Cache Creek, about forty-five miles from Williams in Colusa County. They are readily reached by railroad from Sacramento to Williams, and thence by stage to the springs. As just stated, the location is near the head of Cache Creek, a beautiful spot, shaded by live oaks, and they have become a favorite resort as well of the pleasure seeker as of the victim of disease. There are two principal mineral springs, one, on the side of the cañon, supposed to contain among its prominent ingredients salines in combination with iron; another, rising in the bed of the creek, called the Soda Spring, highly charged with carbonic acid, which is seen to arise in bubbles to the surface. This latter water is used as a pleasant exhilarating drink with syrup. In addition to these, there is an inexhaustible spring of pure, cold water. All the springs are cold, said to be of the temperature of about fifty degrees Fahrenheit.

The waters at Allen Springs have acquired considerable reputation in hepatic affections, and especially in chronic renal diseases. Dropsy, associated with the latter, has been greatly relieved, and in an extreme case, reported to the writer, cured by the use of the water.

No analysis of the water has been reported, but it is regarded by those familiar with it as being one of the most pleasant and profitable resorts in its neighborhood, on account of the pure, dry atmosphere of the locality, its excellent accommodations, not less than the medicinal qualities of the water.

#### GEYSER SPA SPRING.

This spring is located in Sonoma County. The solid contents in one quart of water are reported as follows:

	Grains.
Bicarbonate of soda.....	5.87
Bicarbonate of magnesia.....	2.45
Carbonate of iron.....	0.95
Carbonate of lime.....	1.14
Chloride of sodium.....	2.49
Sulphate of soda.....	0.85
Silica.....	0.45
Loss.....	0.08
Total.....	14.28

The water of this spring, like some other mineral waters, is bottled and sold for ordinary use. It is esteemed by many as an antacid, and mild corrective of disordered digestion.

A mistake has been made by some who have written upon the subject of the mineral waters of California in confounding this spring with Skaggs' Spring—an almost identical analysis having been given for both. The Geyser Spa Spring was analyzed some years ago by Bauer, it is believed, or by Dr. Price. Of the Skaggs Spring only one analysis has been published—by Professor Hilgard. It is given in its proper place.

#### NEW ALMADEN VICHY WATER.

The spring containing this water is located in Santa Clara County, near the New Almaden mines, about sixty miles south of San Francisco. It has been much used in old rheumatic and gouty affections, and is of value in debilitating and chlorotic affections, and in some gastric disorders and diseases of the liver. It has been advised in renal affections and gout. Analysis gives this result to each quart (name of the chemist not known):

	Grains.
Carbonic acid.....	28.02
Bicarbonate of soda.....	50.03
Bicarbonate of lime.....	8.00
Oxide of iron.....	1.02
Sulphate of lime.....	10.05
Sulphate of magnesia.....	3.00
Chloride of sodium.....	8.04
Solid constituents, with traces of silica.....	108.16

#### ALKALO-SALINE SPRINGS.

##### HOT BORATE SPRINGS.

This remarkable spring is situated in Lake County, near the town of Lakeport, at an elevation of about 1,500 feet. It is easily reached by the Napa Valley railroad to Calistoga, and thence, thirty miles, by stage.

Little is known of the mineral character of this spring beyond what is reported by J. D. Whitney in the first volume of the Geological Survey of California. He says: "Near the sulphur bank just at the edge of the lake is a hot spring, of which the outlet is, even at low water, partly beneath the lake, so that the amount which flows from it cannot be ascertained without some expenditure, to keep out the surrounding water. The flow of this spring seems to be quite variable at different seasons, and probably the amount of materials it holds in solution is far from constant. Dr. Veach found the area over which hot water was percolating through the sand to be one hundred and fifty by seventy-five feet in dimensions. At the time of our visit it was much less, nor was the estimated yield anything like as great as he made it, namely, three hundred gallons per minute.

The water of this spring, as analyzed by Mr. Moore, is found to be of a remarkable character. His analysis is subjoined:

	Grains.
Chloride of potassium .....	Trace.
Chloride of sodium .....	84.62
Iodide of magnesium .....	.09
Bromide of magnesium .....	Trace.
Bicarbonate of soda .....	76.96
Bicarbonate of ammonia .....	107.76
Biborate of soda .....	103.29
Sulphate of lime .....	Trace.
Alumina .....	1.26
Carbonic acid, free .....	36.37
Silicic acid .....	8.23
Matters volatile at a red heat .....	65.77
Total, in one gallon .....	484.35

In this table the constituents are necessarily calculated as anhydrous salts. The biborate of soda, however, contains about forty-seven per cent. of water when crystallized, and the 103.29 grains given above correspond to 195.35 of crystallized borax. The most extraordinary feature in the above analysis is the large amount of ammoniacal salt shown to be present in this water; in this respect exceeding any natural spring water which has ever been analyzed.

The borate spring has been used in nephritic and calculous diseases, dependent on excess of lithic acid, and also in certain scaly cutaneous eruptions.

#### BARTLETT SPRINGS, LAKE COUNTY.

The Bartlett Springs are among the most popular of any of the numerous resorts of Lake County, at least among the population of the central portion of the State. They are located in the southern portion of the county, near the head of Cache Creek, and about forty-five miles from the town of Williams, in Colusa County, from which place they are reached by stage. The situation is upon a *flat* surrounded by hills; upon the southeast slope of one of these lie the springs. The place is said to be quite uninviting, unadorned by nature, and not greatly improved by art, yet it is regarded by many as a veritable Mecca, to which an annual pilgrimage is to be made for the restoration of health. These number hundreds every season, with almost every variety of chronic disease, some of them, unfor-

tunately, consumptives, who not only fail to receive benefit, but inevitably succeed in hastening the progress of disease and its fatal termination. It is said that the proprietor of the hotel has, latterly, advised the latter class of visitors not to remain there.

There are two principal springs—one yielding the “Bartlett” water proper, and the other said to contain soda and iron. No thorough or authentic analysis of either of these springs has been made, but a doubtful qualitative examination is said to have revealed *arsenic* among ingredients in the “Bartlett” water. It is pleasant to the taste, is cathartic, and very decidedly diuretic; it is also alterative; and the fact cannot be denied that it has been shown by abundant testimony to be of very considerable efficacy in many cases of chronic rheumatism, skin diseases, and hepatic and renal affections. It is much esteemed in dropsy, in uterine catarrh, and in functional derangements of that organ; in neuralgia and chronic malarial affections.

It is to be regretted that no analysis of this water has been authorized by the proprietor, or owner, as there is almost no spring in California possessing a higher reputation.

Both the springs contain cold water, which is used internally.

The altitude of the locality is less than that of many other watering-places in Lake County.

#### TOLENAS SPRING.

The water of this spring is to be classified as *alkaline*, or alkalo-saline, though no analysis has yet been made of it. The location is about five miles north of Suisun, easily reached by the lines of the Central Pacific Railroad from Sacramento or San Francisco to Suisun, and thence private conveyance. The place is said to be resorted to by many invalids from that portion of the State, who, for the most part camp in the vicinity. Small cabins have been erected for those who prefer an in-door life.

The water is esteemed by many who have used it for its efficacy in chronic dyspepsia, and in renal disease. It is charged with carbonic acid gas and bottled at the spring, and sold to saloons and private families.

### CHALYBEATE AND ALKALO-CHALYBEATE SPRINGS.

#### PACIFIC CONGRESS SPRING, OR SARATOGA SPRING.

This is a saline water arising in the Coast Range Mountains, ten or twelve miles southwest from Santa Clara. The locality is one of natural beauty, healthful, and admirably suited as a resort for those seeking a pleasant retreat from the cares and excitement of city life, where pure air and varied scenery combine to invigorate both body and mind. Excellent accommodations have been provided, the grounds have been improved, shady walks laid out, bath houses erected, the water being artificially warmed to any desired temperature, and everything is arranged to ensure the comfort and enjoyment of the visitors. It has become, of late years, one of the most fashionable watering places of California.

Like the water of the Napa and Litton Springs, this too is bottled upon the premises, and sold in the cities of the State. It is highly

prized by many for its agreeable taste and antacid properties. In acidity of the stomach, in indigestion, in cases of faulty and depraved secretions from the liver, its use has become familiar to many who receive it at their own homes. The large amount of iron it contains would almost entitle it to be ranked as a chalybeate water, and renders it of essential service in chlorosis, anæmia, and wherever iron in combination with salines is indicated.

Used freely at the springs before breakfast, this water acts as a purgative. It has a decided diuretic action when taken during the day in non-laxative doses.

Analysis yields the following result in each gallon of water :

	Grains.
Chloride of sodium.....	119.159
Sulphate of soda.....	12.140
Carbonate of soda.....	123.351
Carbonate of iron.....	14.030
Carbonate of lime.....	17.295
Silica, alumina, and traces of magnesia.....	49.882
Total.....	335.857
Temperature, 50° Fahrenheit.	.

The above analysis was made, I believe, by Bauer.

#### NAPA SODA SPRINGS.

Probably no mineral water in California is so well known, or has maintained its reputation among the community to the same extent, as has that which goes under the name of Napa soda. It is sold and used as a beverage in almost every city and town in the State, and is esteemed as a pleasant exhilarating drink during the Summer months. The spring is located on the western slope of the mountains east of Napa Valley, and only seven or eight miles from Napa City, and has from an early day been a favorite resort of the invalid. Its mineral combinations are such as to make it valuable as a tonic in anæmic conditions of the system, and in chronic dyspepsia where there is a predominance of acidity. It has been found to be an efficient aid to digestion, and a useful tonic, yet gentle aperient, when taken in the morning before eating, by delicate females, and is rendered more efficient by the addition of a grain of the sulphate of iron to a bottle of the water.

L. Lanzwurt reported the following analysis, representing the constituents of one quart of water:

	Grains.
Bicarbonate of soda.....	3.28
Carbonate of magnesia.....	6.53
Carbonate of lime.....	2.72
Chloride of sodium.....	1.30
Subcarbonate of iron.....	1.96
Sulphate of soda.....	0.46
Siliceous acid.....	0.17
Alumina.....	0.15
Loss.....	0.62
Residuum from evaporation.....	17.19

Besides the value of this water medicinally, its location upon the mountain side of the beautiful and healthful valley from which its name is derived, gives it decided advantages over many other watering places in California.

#### LITTON SELTZER SPRING, SONOMA COUNTY.

This spring is pleasantly located near Healdsburg, Sonoma County, on the line of the San Francisco and North Pacific Railroad, by which access from San Francisco is rendered easy. It is a carbonated alkaline water, clear, sparkling, and pleasant to the taste. The locality is much resorted to as a retreat from city life and cares, and on account of the medicinal properties of the water. The latter has been introduced into the market in bottles, and forms an agreeable beverage and antacid. It contains a larger proportion of iron than most other mineral springs in the State.

The following analysis has been reported by Henry G. Hanks:

##### QUALITATIVE ANALYSIS.

*Specific Gravity*, 1.0038.

When freshly drawn, the water is slightly acid. After standing, it becomes alkaline. The following substances were found: *Acids*—Boracic, carbonic, hydrochloric, sulphuric, silicic. *Bases*—Alumina, ammonia, iron, lime, lithia, magnesia, potash, soda, organic matter.

From the manner in which the qualitative analysis was made, the following compounds are known to exist in the water: Bicarbonate of iron, bicarbonate of lime, bicarbonate of magnesia, carbonate of potassa, carbonate of soda, chloride of sodium, sulphate of lime, sulphate of magnesia.

##### QUANTITATIVE ANALYSIS.

One wine gallon of water contains of solid constituents 228.69 grains, in the following proportions: Carbonic acid (combined), 42.96; chlorine, 78.38; sulphuric acid, 2.36; silicic acid, 2.92; oxide of iron, 2.85; lime, 4.41; magnesia, 5.24; soda, 62.19; alumina, ammonia, potash, lithia, boracic acid, organic matter, 27.38; total grains, 228.69.

The amount of free carbonic acid in the water which *escapes on standing*, and is not calculated in the above analysis, is equal to 383.75 grains per gallon. The water from which this analysis was made was taken by myself from the spring with all the precautions usual in such cases. The water is exceedingly pleasant to the taste, owing to the free carbonic acid which it contains. This gas is so excessive in the natural water that a strong bottle filled by myself exploded after standing a short time in a cool place. The water in the spring is abundant. When required for bottling, it is forced into a receiver, from which it is drawn into bottles and quickly corked. No carbonic acid gas is added artificially to the water.

HENRY G. HANKS, Analytical Chemist,  
617 and 619 Montgomery Street.

SAN FRANCISCO, March 29th, 1875.

#### SUMMIT SODA SPRINGS.

The location of these springs is near the summit of the Sierra Nevada Mountains, twelve miles from the Central Pacific Railroad. The access is by that road, from Sacramento to Soda Springs Station, thence by stage to the valley in which the water is found. The road to the springs is good, winding along the mountain side, so as to afford an easy descent to the valley below, the eye being continually greeted, during the route, by scenes equal in grandeur to almost any which the Sierras afford. The springs themselves are beautifully located in an expansion at the head of the deep cañon, along which winds one of the forks of the American River. The accommodations for visitors are excellent—supplying every needful comfort. The man of leisure may here enjoy a few weeks upon the hills in search of grouse, quail, and deer, or along the stream, with the rod; and he who, tired with the routine of business, seeks rest for body and brain,

can find no more delightful or invigorating locality than in the pure atmosphere and amid the grand scenery which nature everywhere exhibits. The altitude of the spring is 6,009 feet above the sea, or 1,000 feet below the summit of the mountains. The air is dry, pure, and invigorating; the temperature, during Summer, sufficiently equable and agreeable. During the Winter, access is difficult, or even impossible, on account of the snow.

Aside from the advantages afforded to the valetudinarian, by the water, the place is regarded an excellent one for the invalid in the early stage of phthisis, possessing, in an eminent degree, the requisites of a dry, pure atmosphere, and the very best facilities for camping and out-door exercise.

This might, according to the arrangement of some authorities, be called an "earthy-saline" water, although the large amount of carbonic acid it contains allies it to the *carbonated* waters. It should, therefore, if we can judge from its constituents and their known properties, possess, in a high degree, the remedial virtues which are supposed to pertain to these classes. Thus, the carbonic acid gives it a place in torpid digestion and certain dyspeptic troubles, while the association of its gaseous element with the alkalies and earths, with chloride of sodium and iron, makes it efficacious in diseases due to a scrofulous diathesis, in rachitis, in chronic affections of the mucous membranes, especially of the intestinal canal, in rheumatism, and in cases requiring its diuretic action. In fact, in some of these, more particularly in chronic catarrhal disorders and in rheumatism, it has been used with marked benefit. Probably, also, taken in connection with the climate of the locality, its elevation, its invigorating influence, it would prove effectual as a tonic and restorative in some nervous disorders, in anæmia and chlorosis, in atony of the mucous membranes, in debility, and in convalescence from acute disease.

It has been stated that the springs contain a large amount of carbonic acid, sufficient, when the water is drank on the spot, to impart to it an agreeable, piquant taste. It is seen continually to rise through the spring in the form of air bubbles, giving the appearance of boiling. Analysis yields the following results in a wine gallon:

	Grains.
Carbonic acid, 186.35 cubic inches.....	
Bicarbonate of lime.....	43.20
Carbonate of magnesia.....	4.20
Carbonate of soda.....	9.50
Chloride of sodium.....	26.22
Oxide of iron.....	1.75
Silica.....	2.06
Alumina.....	1.75
Potassa—trace.....	
Total.....	88.68

This water was analysed by J. F. Rudolph. The water used for the purpose was brought from the spring in bottles, carefully corked and sealed, but had lost a certain quantity of carbonic acid gas. The water at the spring is clear, cold, and sparkling, constantly more or less agitated by escaping carbonic acid.



## SEIGLER SPRINGS.

The value of these springs has long been recognized by the people in the central part of the State, and they have been much frequented by individuals. The location, near the head of a cañon, at an elevation, according to my informant, of more than 2,500 feet, is a pleasant one, and the scenery attractive.

There are hot and cold springs—a soda spring, and a chalybeate spring. There is a hotel on the premises, and the surrounding grounds are suitable for camping. All the usual conveniences are provided for visitors—bath houses and a spacious plunge bath.

One of the springs is said to contain arsenic, and to have been found decidedly valuable as a remedial agent in chronic cutaneous diseases.

An analysis is said to have been made of the Seigler Springs for a private individual by whom they were purchased and extensively improved. I have not been able to obtain a copy.

## SODA SPRINGS—SHASTA COUNTY.

So far as has been ascertained, no analysis has been made of these springs. The locality is of frequent resort, not so much on account of the medicinal value of the water, though this is held in high estimation, as for the advantages afforded in their vicinity for fishing and hunting.

Professor J. D. Whitney thus speaks of the springs in his Geological Report, Vol. I :

“There are two groups of mineral springs in this vicinity, one of which is on the east side of the Sacramento, nearly opposite the mouth of Castle Creek ; the other is three and a half miles farther up and eight miles from Strawberry Flat, at the base of Mount Shasta. The first is called ‘Lower Soda,’ the other ‘Soda Springs.’ The latter are in the cañon of the Sacramento, at an elevation of 2,363 feet, and they are considerably resorted to, the water having a high reputation for its tonic effect, and being reported to have a specific action on the kidneys. The water is a chalybeate, there being an extensive ferruginous deposit around the spring. It is also highly impregnated with carbonic acid, sparkling like soda water, whence the name which is usually given in California to springs giving off carbonic acid, and not to those containing carbonate of soda. The temperature of the water was 52° in September, eighteen hundred and sixty-two.”

The surroundings of these springs—the locality in which they are situated—is said to be one of the most beautiful in the northern portion of the State, inviting the visitor by its magnificent forests, its dry, cool air, and its clear, pure water. Dr. Price informs me that he regards this spring as more highly chalybeate than any he has examined in this State.

The springs are reached from Sacramento, by the California and Oregon Railroad to Redding, and thence by stage about seventy-five miles.

## SALINE SULPHUR SPRINGS—TUSCAN SPRINGS, TEHAMA COUNTY, CAL.

These springs have long been regarded by the residents of that portion of the State as possessing decided medicinal properties. They are located about nine miles from Red Bluff, on the Sacramento River,

easily accessible from the latter by a good road. The locality itself is rough, rugged, and uninviting, being surrounded by evidences of volcanic convulsion, at an altitude of about six hundred feet. A hotel on the premises affords plain but comfortable accommodations to the visitor intent on the recovery of health rather than the pursuit of pleasure.

There are three principal springs, two of which are used for drinking purposes. They belong to the class of "cold sulphur waters." Bath houses have been erected, the water being heated by utilizing the carburetted hydrogen evolved.

Experience has abundantly demonstrated the efficacy of the Tuscan waters in chronic rheumatism, cutaneous diseases of several forms, and constitutional syphilis. They are also said by Dr. Cameron, of Red Bluff, and other physicians, to be almost infallible in the cure of intermittent fever. They have a strongly saline taste, not unlike the Blue Lick water of Kentucky. They act, in most cases, efficiently upon the kidneys, and, with many, as an aperient. They are exceptional in their composition as containing iodine in considerable quantity. The temperature was determined at 78° to 80° for the "Red spring," 68° for the Black, and 66° to 70° for the White.

A partial analysis of what is called the "Red water" gave the following results: Acid, sulphuric; acid, carbonic; acid, hydrochloric; iron, as bicarbonate; lime; potassa, as chloride; soda, as chloride; magnesia; lithia; alumina; iodine. Quantitative analysis, roughly made, gave iodine to the extent of 0.06 grammes per imperial gallon; nearly twenty-five grammes of soda; one gramme of lithia; a large amount of potassa.

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## ALKALINE-SULPHUR.

### WITTER SPRING, LAKE COUNTY.

This spring is situated in a deep cañon of the Coast Range Mountains, three miles east of the Blue Lakes, five miles from the town of Upper Lake, and fifteen miles from Lakeport. The scenery is attractive, a fine view of Clear Lake being afforded from the surrounding hills. The elevation is not known. There is a good public house, and a number of cottages, or cabins, for the use of visitors.

There are several springs, the principal one, most relied upon by the afflicted, going under the emphatic name of the "Dead Shot," reference being had to its remarkable efficacy in chronic rheumatism, and in skin diseases, scrofulous and syphilitic. It is cold.

In addition to the above, there is one sulphur spring, which is artificially heated for bathing purposes, and one chalybeate spring.

No analysis has been published.

### PEARSON SPRINGS, LAKE COUNTY.

The Pearson Springs are located in an elevated valley, about two hundred yards wide, between two high mountains. The situation affords superior accommodations for parties camping out. They are about one and a half miles distant from the Blue Lakes, fourteen miles from Lakeport, and one mile west of Witter Spring. The

elevation is not known, though it must be above two thousand five hundred feet. On the hillside, east of the valley, are five springs; the most northern is known as the "Sulphur and Soda" spring; next on the south is the "Bartlett" spring, so called from its resemblance to the principal water at the springs of that name; next, south, is the "Soda" spring; next is the so-called "Gas" spring, this name being applied on account of the large amount of carbonic acid escaping; it is said to be strongly chalybeate; the character of the next spring, the last going south, is unknown.

The gas spring is gently cathartic, and its continued use is said to be an excellent remedy in *habitual constipation*; it is also diuretic, and is supposed to exert a specific influence upon the liver, relieving cases of *jaundice*. It has a reputation as a tonic.

The "sulphur and soda" spring is resorted to for the purposes to which that class of waters are usually applied, and has the asserted merit of curing obstinate *catarrhal* affections and *sick headache*. It is used more than any of the other waters here for bathing purposes, being artificially heated for the purpose. The "soda" spring is used as a beverage. All these springs are *cold*.

Route: railroad to Cloverdale, thence by stage; or by railroad to Calistoga, thence by stage to Lakeport, thence by private conveyance.

## THERMAL SPRINGS.

### PASO ROBLES SPRINGS.

These springs belong to the "thermal sulphurous" class. They are so named from their locality being in a *pass of oaks*. The location is in San Luis Obispo County, access being by stage from the City of San Luis Obispo—a half day's ride—or, by the same mode of conveyance, from the present terminus of the Southern Pacific Railroad (Northern Division) at Soledad.

Probably few of the mineral springs of California have acquired a greater or more favorable reputation than these. It is one of the few places of the kind which is conducted upon a systematic plan, under the medical supervision of a competent physician. The hotel is within a convenient distance of the springs, and is provided with every needful comfort. The locality is amid a grove of beautiful oaks, affording shade during the hottest part of the day, while the temperature in Winter is such as to make the advantages of the springs available, even at that season.

There are several springs, varying in temperature from 110° to 140° Fah. The water is used for drinking purposes as well as bathing, and swimming baths have been prepared for both sexes.

The analyses given below show these springs to be particularly rich in bicarbonate of soda and chloride of sodium. They are actively diuretic and diaphoretic, and, when liberally used, laxative. They are particularly distinguished for their curative properties in constitutional syphilitic disease, in chronic rheumatism, and in intractable malarial affections.

A number of instances have come under the observation of the writer, in which great benefit has resulted from a course of treatment

at Paso Robles in syphilitic neuralgia, and obstinate cutaneous diseases arising from the same constitutional cause.

## ANALYSIS IN ONE IMPERIAL GALLON.

	Grains.
Free carbonic acid.....	10.50
Sulphate of lime.....	3.21
Sulphate of potassa.....	0.88
Sulphate of soda.....	7.85
Peroxide of iron.....	0.36
Alumina.....	0.23
Silica.....	0.44
Bicarb. magnesia.....	0.92
Bicarb. soda.....	50.74
Chloride of sodium.....	27.18
Iodides and bromides—traces.....	
Organic matter.....	1.64
Solid contents.....	93.44

In addition to the drinking water and baths at Paso Robles, there are what are known as the mud or "moor" baths, in which the patient is immersed for a certain length of time. They act, probably, mainly by their high temperature, though it is possible that their solid constituents and volatile acids may add to their remedial influence. On account of their relative conductive power, they may be used at a much higher temperature than water baths. They are stimulating to the skin and nervous system, promote the secretions, and have been thought to be particularly indicated in anæmia, chlorosis, old and obstinate rheumatic and syphilitic affections, in chronic hypertrophy of the liver and of the uterus; also, in old indolent skin diseases.

The analysis of the mud or "moor" bath of Paso Robles makes its constituents as follows:

	Grains.
Sulphate of lime.....	17.90
Sulphate of potassa—traces.....	
Sulphate of soda.....	41.11
Carbonate of soda.....	5.21
Carbonate of magnesia.....	3.10.
Chloride of sodium.....	96.48
Silica.....	1.11
Organic matter.....	3.47
Total.....	168.38

It contains, also, of carbonic acid, 47.84 cubic inches, and of alumina and the protoxide of iron, traces.

## ALUM ROCK SPRING, SANTA CLARA COUNTY.

This spring, or rather the several springs to be found here, is located about seven miles from San José, in what is known as Penitentiary Cañon, a romantic passage on the western slope of the Coast Range

mountains. It is so named in consequence of the habit among the Jesuits, according to tradition, of assembling there to perform penance. When visited by the writer, about four years ago (eighteen hundred and seventy-six), the accommodations at the house were poor and unsuitable for the reception of visitors. Possibly they have since been improved. The locality is a pleasant one, the surroundings wild and romantic, and in the streams near by facilities are afforded for trout fishing; while the hills everywhere abound in quail and other game. The elevation of the place above the sea is not known, but it is sufficient for most sanitary purposes. The highest Summer atmospheric temperature known there was said to be  $90^{\circ}$ ; the lowest at night,  $68^{\circ}$  to  $70^{\circ}$ , F. The Winter temperature is never too low for comfort. There were noted four springs: the first, nearest the house, used mainly for bathing purposes, and running into the bath house, temperature,  $85^{\circ}$ ; second, what is called the drinking water; third, the sweet sulphur; fourth, also sulphurous, but weaker than that last mentioned in sulphur and in acidulous salines. It is not known that any complete analysis has been made of those springs. They are considered beneficial in anæmic and atonic conditions of the system, in chlorosis, in chronic malarial cachexia, and in debilitated states generally.

A partial analysis of the drinking water gave the following results, qualitatively: Acid hydrosulph., chlorine, acid sulph., silica, acid carbonic, alumina, manganese, magnesia, lime, soda, potassa, free carbonic acid.

Imperfect quantitative examination gives the following: Oxide of iron, 0.30 grains per imperial gallon; alumina, 0.15 grains; manganese, 0.70 grains; soda, 3.4 grains; potassa, 0.2 grains; chlorine, 1.6 grains; sulphydric acid, 3.3 grains.

#### ÆTNA SPRINGS, NAPA COUNTY.

These springs lie at or near the upper end of Pope Valley, at an altitude of one thousand feet. They are easy of access from the Town of St. Helena, from which they are sixteen miles distant, by an excellent graded road over Howell Mountain. The location is a pleasant one, the surrounding wild and picturesque, and the atmosphere dry and sufficiently equable. As in most mountain valleys, the temperature at noon in Summer is warm, yet this heat is soon relieved by a breeze from the lower portion of the valley, and, on account of the absence of much humidity, is not oppressive. Cottages have been erected for the comfort of visitors, while the grounds afford ample facilities for camping. There are two principal springs, seemingly nearly identical in composition. The temperature is  $98^{\circ}$  Fahrenheit, and the water is used mainly for drinking purposes. Another, with a temperature of  $106^{\circ}$  Fahrenheit, supplies the bath house. The two first mentioned springs are clear and sparkling, carbonic acid gas being seen to be continually bubbling at the surface. There are also springs called "soda" springs, said to contain iron.

The Ætna Springs, though open to the public for only a few years, have already attained considerable reputation; and appear to be rapidly gaining the confidence of certain classes of invalids. Testimonials—perhaps a better test of the value of a mineral water than the most elaborate analysis—from intelligent persons; some of them medical men, have been given, of relief afforded by the use of the water in renal affections, rheumatism, neuralgia, hepatic engorgement,

and other similar diseases. They have been compared, not inaptly, in composition and effects, to the Ems water of Europe. The following comparative analysis has been published:

CONTENTS IN A GALLON.	EMS.	ÆTNA.
	Fresenius.	Bauer.
Carbonate of soda, grains -----	84	75
Carbonate of magnesia, grains -----	7	14
Carbonate of lime, grains -----	10	10
Carbonate of iron, grains -----	trace.	-----
Sulphate of soda, grains -----	trace.	8
Sulphate of potash, grains -----	3	-----
Chloride of sodium, grains -----	62	29
Silica, grains -----	3	trace.
Total solids, grains -----	170	137
Carbonic acid, cubic inches -----	59	58
Temperature, degrees Fahrenheit -----	115	98

#### SKAGGS' HOT SPRINGS, SONOMA COUNTY, CALIFORNIA.

These springs are located in the Coast Range Mountains, fourteen miles north west of Healdsburg, and eight miles west of Geyserville. They are of easy access by steamer from San Francisco to Donahue's Landing, thence by San Francisco and North Pacific Railroad to Geyserville, thence by stage, up a romantic cañon to Skaggs' Hotel. The Coast Range hills on the west side of Russian River, through which the traveler rides in visiting this resort, present a pleasing and varied landscape, and show range of country not unlike that further south about San Rafael in Marin County, or even in San Mateo and the Diablo hills of Contra Costa County. The springs and chalybeate well are on the verge of a small "flat" caused by the convergence of the sloping bases of several hills. A hotel has been provided, neat in appearance and well kept, and a number of small cottages for families or invalids, and the excellent accommodations, together with the pure air, the scenery, and the medicinal properties of the water, render the place attractive to those seeking rest from the excitement of fashionable life in the metropolis. There are, besides, good facilities for sport—trout in the streams, and quail, grouse, and deer among the hills.

There are two springs of hot water, a small cold soda spring, and a chalybeate well. The principal spring—that most used for drinking and bathing purposes—is situated in the bed of Dry Creek—a tributary of the Russian River. It has a temperature of from one hundred and thirty to one hundred and forty degrees Fahrenheit, is clear, sparkling, and pungent to the taste from the large amount of free carbonic acid it contains.

This water has been much recommended for rheumatism, sciatica, neuralgia, some forms of indigestion, and in chronic disease of the kidneys. It is believed by the writer to be one of the best springs, of which an analysis has yet been obtained, in the indigestion induced by the too free indulgence in alcoholic stimulants, and for the kidney difficulties which complicate such cases.

The following analysis was made by Professor E. W. Hilgard of

the State University ; another, made by the writer, giving substantially similar results, is omitted :

	In 10,000 Parts.	Grains per Gal.
Chloride of potassium.....	0.035	0.200
Sulphate of potassium.....	0.043	0.260
Chloride of sodium.....	1.012	5.900
Iodide of sodium.....	Trace.	Trace.
Bi-carbonate of sodium.....	27.672	161.270
Bi-borate of sodium borax.....	4.542	26.470
Carbonate of lithium.....	0.010	0.060
Carbonate of barium.....	0.040	0.240
Carbonate of strontium.....	0.004	0.024
Carbonate of calcium.....	0.377	2.197
Carbonate of magnesium.....	0.191	1.113
Carbonate of iron.....	0.009	0.054
Alumina.....	0.004	0.004
Silica.....	1.205	7.023
Total solid ingredients.....	35.144	205.215

#### WHITE SULPHUR SPRINGS, ST. HELENA.

These springs are located in Napa Valley, about two miles from St. Helena. They are of easy access by the Vallejo and Calistoga Railroad. The grounds have been beautifully laid out and ornamented with shrubbery and evergreens, neat cottages have been erected for visitors, and the entire place, with its surroundings, is one of the most pleasant of our Summer retreats. There are nine springs, possessing substantially the same medicinal properties, varying only in temperature and in the relative proportion of their solid constituents. Of three of these a quantitative analysis has been made by Professor LeCompte, the result being the following, in a wine gallon:

	No. 2.	No. 6.	No. 7.
Temperature of spring, August, 1871.....	89.6 F.	86.0 F.	69.8 F.
Specific gravity.....	1.00026	1.00040	1.00038
SOLIDS.		Grains.	
Carbonate of lime.....	1.25	2.44	5.56
Carbonate of magnesia.....	0.62	0.56	4.36
Sulphate of soda.....	8.26	11.33	12.84
Chloride of sodium.....	21.72	23.41	14.23
Chloride of calcium.....	1.32	0.86	0.78
Chloride of magnesium.....	0.87	2.22	0.65
Sulphides sodium and calcium.....	2.65	1.85	1.62
Total.....	36.69	42.67	40.04
GASES.		Cubic inches.	
Sulphuretted hydrogen.....	6.15	4.25	Trace.

The other springs, of which only a qualitative analysis has been

made, possess the same ingredients. The waters are used both internally and for bathing.

These springs belong properly to what are called the "light sulphur" waters. Taking into consideration their temperature, more especially that of Number One, which is used principally for bathing purposes, and which is thought to contain a greater proportion of sulphuretted hydrogen than the others, we can imagine them useful for the general purposes to which this class of waters are adapted. At the present time, and under present management, the place is kept rather as a pleasant, healthful, and fashionable resort for the wealthy citizens of the metropolis and other cities, than as a sanitary retreat. For the former it is delightfully adapted; for the latter it might be profitably employed.

#### CALISTOGA SPRINGS.

Nine miles from St. Helena, at the present terminus of the Napa Railroad, lies the pleasant locality of Calistoga, five hundred feet above the sea. There are five or six principal springs. They are sulphurous and thermal—the temperature of one which was tested being 97°. The waters are employed both for drinking and bathing, and suitable conveniences for the latter have been prepared. They appear to be similar to those of St. Helena, yet probably lighter, containing less of the sulphuretted hydrogen and of the metallic sulphides. They have been used with advantage in the diseases to which this class of waters are suited, especially in rheumatic affections. Like the springs at St. Helena, there is the additional advantage of a good hotel. Analysis yields the following result in each gallon of water:

	Grains.
Sulphuretted hydrogen gas—3.271 cubic inches .....	
Chloride of sodium .....	22.250
Chloride of calcium .....	3.263
Carbonate of soda .....	3.406
Sulph. soda .....	1.616
Sulph. magnesia .....	0.466
Silica .....	6.500
Alumina—trace .....	
Total .....	37.501

The above analysis was made by J. F. Rudolph of Sacramento.

A commodious swimming bath has been erected on the grounds, adding probably in some degree to the efficacy of the water in its external use.

#### HARBIN SPRINGS.

Twenty miles from Calistoga, in a wild and picturesque cañon of the Coast Range of mountains, are what are known as the Harbin Springs. Here, too, are numerous springs, possessing substantially the same medicinal and chemical properties. Like the others of which mention has been made, these are thermal, the principal spring having a temperature of 118° at its source. From this the water is led into bath houses, arranged in such a manner that baths can be obtained of any desirable temperature, either hot



or tepid, according to the distance from the source of the supply. Connected with each bath are facilities for the application of steam. No accurate analysis has yet been made of the water, though an imperfect qualitative analysis is said to show the principal constituents of the two main springs to be, of the one, magnesia and soda, and of the other, the additional ingredient of iron, both being impregnated with sulphuretted hydrogen.

The springs at this place have acquired a reputation, in the portion of the State in which they are located, second to no others. They are frequented by invalids, in fact, from almost every section of California, and, during the Summer months, the grounds in the vicinity are alive with visitors, encamped on every available spot. Several neat cottages have been erected and fitted up for the accommodation of those desiring them. The approach to the spot is romantic and attractive, and the climate, except during the extreme heat of the day, unexceptionable. The house is kept open to visitors during the entire year, and the Winter temperature appears to be suitable for a very large class of invalids. The mean temperature of February, eighteen hundred and seventy-two, at seven A. M., was  $41^{\circ} 9'$ , and at one P. M.,  $57^{\circ}$ . The lowest morning temperature during the month was  $38^{\circ}$ , the highest,  $52^{\circ}$ ; the lowest noon temperature was  $38^{\circ}$ , the highest  $65^{\circ}$ . The altitude of the place is said to be one thousand five hundred feet, and this, taken in connection with the temperature, ought to make it an eligible locality for the consumptive in the early or incipient stage of disease. Such, however, is the general character of the climate of this portion of the Coast Range, and, certainly, no special benefit would be derived, in the disease alluded to, from the use of the water. The Harbin Springs are believed to possess the virtues of the weak thermal earthy-saline and chalybeate-saline sulphurous waters. Several obstinate cases of rheumatism, in the chronic stage, coming under the observation of the writer, have been materially benefited by them, and they have been much recommended in some chronic uterine disorders, such as metritis with hypertrophy. As with most of our springs, we find, from personal observation, as well as from the reports of others, that no system or order is observed by those using the water. Each visitor is free to exercise his own judgment, which he often does to his serious injury.

#### AGUA CALIENTE, OR WARNER'S RANCH SPRINGS.

These springs which have acquired considerable celebrity in the southern part of the State, are located on what is known as Warner's Ranch, in San Diego County, about fifty miles from San Diego City. They are thermal-sulphur waters, and are much resorted to by those suffering from rheumatism, cutaneous diseases, and dropsy. At the present time they are in charge of Indian families, who provide rude, but, it is said, comfortable quarters, for those who prefer not to camp out. By the Indian nations of the country the Agua Caliente Springs are regarded as affording an infallible remedy for all bodily ills; and an intelligent friend who visits the locality annually has informed the writer of what are supposed to be remarkable cures of chronic renal and hepatic diseases.

The late Dr. T. M. Logan published the following account of these

springs, taken from the report of W. P. Blake, Geologist of the United States Exploring Expedition:

The thermal springs, generally known as the "Agua Caliente," are situated on the slope of one of the ridges at the most eastern part of the valley (Warner's Ranch). They have long been resorted to by the Indians for bathing and the cure of various diseases. The water boils up from out of a granite ledge through a number of openings or cleavage fissures, and in one place it appears to have enlarged the opening so that it has become nearly cylindrical. The water flows copiously from different apertures, and the united streams give a volume of water about equal to what would be delivered from a two-inch pipe under a pressure of one or two feet. These openings are in a slight ravine, which appears to have been the bed of a brook that is now deflected from its course by a dam built for the purpose by the Indians.

In descending towards the spring, the odor of sulphuretted hydrogen is at once perceptible, and a slight cloud of steam arises from the water. The temperature of the water was taken, and the following are the results:

First, or principal spring .....	142° F.
Second spring .....	141° F.
Third spring .....	140° F.
Fourth spring .....	140° F.
Fifth spring, ten feet distant.....	136° F.
Stream below the springs.....	130° F.
Stream above the springs.....	58° F.
Air .....	74° F.

Time, nine o'clock a. m., November 30th, 1853.

Bubbles of sulphuretted hydrogen were constantly escaping, and the water was highly charged with it, and had an acid taste that was quite agreeable. There was only a slight deposit or incrustation on some of the rocks (consisting of sulphur). A small jet of steam was constantly issuing from a crevice near the main spring, producing a slight hissing sound like steam from a leak in a boiler.

#### SAN BERNARDINO HOT SPRINGS.

These springs, which belong to the calcareous thermal class, are situated five miles from the Town of San Bernardino, and about sixty miles from Los Angeles, in an easterly direction. They are easily accessible by the Southern Pacific Railroad from Los Angeles to Colton, and thence by stage. They lie on the side of the San Bernardino mountain.

There being no other available account of these springs, I again extract the report of W. F. Blake, from the paper of the late Dr. Logan:

The warm and hot waters gush out from the granitic rocks on the flanks of San Bernardino and adjacent heights. In one place the springs are so numerous, and the water rises in such volume, that a good-sized mill stream of hot water is formed, which flows down into the valley, and is one of the principal tributaries of the Santa Ana River. This brook of hot water retains a temperature of 100° Fahrenheit, three or four miles from its source.

I visited several of the springs on the sides of the sierra, between San Bernardino Mountain and the Cajon Pass, near the sawmill road. \* \* \* It was evident that the adjacent granite was very near the surface, as shown by one or two outcrops, from one of which the hot waters issued. Small springs rise at intervals of ten or twenty feet along a distance of thirty or forty rods. Their waters unite and form a little stream that empties into the brook a short distance below. The banks of the stream were thickly overgrown with grass. A dense mass of beautiful green *confervæ* grew from the bottom and sides of the channel, and floated in rich waving masses in the hot water. In the immediate vicinity of the springs, however, no vegetable growth was visible. The rocks and gravel in contact with the water were covered with a snow-white incrustation, and little twigs and leaves that had fallen into it were softened to a white, pulpy mass, and were partly incrustated. This was also the case with insects that were lying dead in the shallows of one of the springs, but I could not observe that in either case any petrifaction or internal deposit of mineral matter had taken place. The following temperatures were observed: 172°, 169°, 166°, 130°, 128°, 108°, Fahrenheit. The temperature of the hot stream below all the springs was 130° Fahrenheit, and the mountain brook only 65° Fahrenheit. Temperature of air, 76° Fahrenheit.

The white crust was not found in equal quantities at all the springs. It appeared to be most abundant at one of them. \* \* \* An analysis of the crust, by J. D. Easter, Ph. D., since the return of the expedition, gave the following results:

The aqueous extract contained only a small proportion of chloride of sodium. In hot hydrochloric acid, the mass dissolved with strong effervescence, leaving a residue of silica and alumina. The solution contained: Lime (carbonate), chief constituent; silica (soluble in acid); magnesia; alumina and oxide of iron, traces; phosphoric acid, trace.

The springs are estimated to be at least five hundred feet above the level of the Santa Ana, at the Mormon settlement, and, thus, nearly sixteen hundred and eighteen feet above the sea.

These springs are not the source of the large stream of water first referred to. It takes its rise farther eastward, near the mountain of San Bernardino. I regret that I could not visit its source, as the springs must be of great volume and high temperature to send forth such a large stream of water, retaining its temperature a long distance from the mountains. I was informed there are several other localities of hot springs along these mountains, and there are, no doubt, many that have not yet been discovered. The large stream of hot water appears to be nearly pure.

#### GILROY SPRING.

This spring is located in the mountains of Santa Clara County, about thirty miles from the Town of Gilroy. The access from San Francisco is by the northern division of the Southern Pacific Railroad to Gilroy, thence by stage to the spring. The spring—for there is but one principal spring—is situated in a little mountain valley surrounded by hills. The latter are barren and uninviting, except for the artificial adornments which have been made by cultivation immediately around the spring. The spring itself is located near Coyote Creek. The water is clear, hot, containing, according to an unauthenticated analysis, sulphur, magnesia, iron, arsenic, and iodine. It is used both for bathing and drinking. Gilroy Spring has a wide reputation for its efficacy in rheumatism and cutaneous diseases, and has become a place of fashionable resort. The locality presents abundant sources of amusement and recreation—trout in the creeks, game of all kinds in the hills. The accommodations at the hotel, both at the table and in the sleeping apartments, are excellent.

#### HOWARD SPRINGS, LAKE COUNTY.

These springs are located about five miles from the "Adams" Spring, one and a half from "Seigler," about five north from "Harbin's" in a direct line by trail. They lie in a flat or basin at an altitude of two thousand two hundred and twenty feet, surrounded by hills covered with luxuriant pines. They are reached by the Napa Valley Railroad to Calistoga, and thence by stage. Comfortable accommodations may be obtained at the hotel, and there are also twelve or thirteen neat cottages for those who wish them.

Howard's is rapidly becoming a favorite watering place, and affords advantages not at all times to be obtained at the mineral springs of this section. Trout fishing may be indulged in within a mile of the house; game is plenty among the hills, and what are called the "diamond fields" may be reached by a walk of two and a half miles. Handsome specimens of California diamonds are often found there.

There are said to be fourteen springs, hot and cold, the temperature varying from 58° to 109°, Fahrenheit. One called the magnesia and potash spring, hot; a warm spring, said to be very strongly chalybeate, with some sulphur, but which is highly charged with carbonic acid; a "borax" spring; a "silica" spring; an "alum" spring, and others. All of these have been named in accordance with the supposed predominance of some particular ingredient, there having been no analysis made of any of them.

Excellent bathing facilities have been provided; a hot plunge bath, the temperature being not less than 95° or 98°, and six bath

houses arranged in line, in which water of any desired temperature may be obtained. Number one, the hottest, is said to be about 98°; number two, slightly less warm, and so on to number six, which is cold.

There is, in addition, a very cold, sparkling, and effervescing "soda" spring, so called, but which is clearly acidulous, which is much used as a beverage with syrup, or with the addition of a little bicarbonate of soda and syrup, when it is drank during effervescence.

The diseases for which these springs have been recommended, are mainly rheumatism, dropsy, renal, and hepatic diseases. There is abundant evidence of their utility in dropsy dependent upon Bright's disease, and in uterine congestion.

#### BONANZA SPRINGS, LAKE COUNTY.

The location is upon the mountain side, among pines which surround and shade them, at an elevation somewhat higher than that of "Howard's," from which they are distant about one and a quarter miles. They are reached by Napa Railroad to Calistoga, and thence by stage. There is a warm chalybeate spring, a sulphur spring, and a cold plunge bath. These springs are not open for the accommodation of the public, being the property of a Mr. Duke, whose residence, during the season for visiting the watering-places, is on the premises. Parties camping out upon the surrounding hills may, however, avail themselves of the benefits afforded by the water. The writer is not aware of any analysis having been made of either of the springs. They are used medicinally in renal and hepatic diseases, rheumatism, etc.

#### FULTON WELLS, LOS ANGELES COUNTY.

This pleasant resort is situated about three miles north of Norwalk Station, on the Los Angeles and Anaheim Railroad, and thirteen and one half miles from Los Angeles City. There are two flowing wells of mineral water, bored to a depth of three hundred and fifty feet. The water is cold, strongly impregnated with sulphur, and containing a considerable quantity of carbonic acid gas. The grounds are the property of Dr. J. E. Fulton, an intelligent physician, who devotes his time to the improvement of the place, and the comfort and health of the guests. The salts are mainly held in solution as bicarbonates, the bicarbonate of iron amounting to thirteen grains per gallon of two hundred and thirty-one cubic inches.

The water from these wells has been found beneficial in cutaneous diseases, rheumatism, and scrofulous complaints. Benefit is also said to have been derived by those afflicted with chronic indigestion. It acts gently upon the bowels, and decidedly upon the kidneys. Hot and cold baths are provided, and a swimming bath, the water in which is being constantly renewed, about four feet deep and forty feet in diameter.

The locality is a healthy one, in a beautiful valley, and when the plans for its improvement have been fully carried out, will present many attractions both to the invalid seeking relief from the diseases to which the water is applicable, and to the citizen desiring a retreat for recreation or pleasure. The hotel is now well kept, and well built, while, in their season, wild game of various kinds is abundant.

The following is the analysis of the Fulton Wells:

IN ONE GALLON OF WATER.		Grains.
Bicarbonate of soda	-----	2.20
Bicarbonate of lime	-----	12.00
Bicarbonate of magnesia	-----	16.50
Bicarbonate of iron	-----	13.00
Sulphurate of soda	-----	.90
Chloride of sodium	-----	10.40
White sulphur	-----	23.00
Total	-----	78.00

Sulphurated hydrogen gas and carbonic acid gas in abundance.

#### SANTA BARBARA HOT SULPHUR SPRINGS.

The drive from Santa Barbara to these springs, a distance of about five miles, is through a cañon shaded with thick foliage, and surrounded by wild and varied scenery. From the springs themselves the prospect is beautiful, commanding a view of Santa Barbara and the mountains, on the south and southwest, and the broad ocean on the west. The location is near the head of the cañon, nearly one thousand five hundred feet above the sea, and the atmosphere pure, dry, and invigorating. Although the writer has visited the springs himself, the account given of them by Dr. M. H. Biggs, of Santa Barbara, as recorded by the late Dr. T. M. Logan, will give a better idea of their character than would be conveyed by the record of a single hasty examination :

They number in all seven, and seem to be of two distinct varieties. Those nearest the head of the cañon escape from crevices in the rock, and are four in number, all appearing to have the same properties, the most sensible of which are free sulphur and sulphuretted hydrogen; their temperature, 114° Fahrenheit. Another spring is situated about one hundred yards off, in a westerly direction from the first mentioned; temperature, 117° Fahrenheit. Its principal constituent is sulphate of alumina, evident from the thick incrustation of this salt on the under surface of the rock beneath which this water escapes; it also tastes strongly of sulphate of iron, and is said to contain soda and potash, and a trace of arsenic. The two remaining springs are located in a branch cañon, about one hundred rods in a northeasterly direction from the last one mentioned, and appear to possess the same qualities, with the exception of the temperature, which is only 112° Fahrenheit. No thorough analysis of these mineral springs has ever been made, at least in our time.

It is said that while this country was in possession of the King of Spain, a corps of scientific men was sent out to this coast, commissioned, among other things, to test the properties of the several mineral springs known to abound here; and, that in their report they pronounced the Santa Barbara Hot Sulphur Springs to be the best and most medicinal and superior to any other in California "for the cure of many diseases." Whether they came to this conclusion from actual analysis or from simply witnessing their effect, is not known. Certain it is that at the present day they are becoming famous for their curative effects in many cases of rheumatism, paralysis, various diseases of syphilitic origin, and skin diseases generally; and from persistent use of the waters (drinking and bathing) many individuals have been cured of such affections.

A large, deep spring, or excavation, is used as a plunge bath for those who desire it. The locality of these springs is adapted for a resort for those suffering from other diseases than those to which the water is applicable. The dryness of the atmosphere, the altitude of the place, and its exemption to a very great extent from the northwesterly currents which prevail below, make it a suitable place for the victim of consumption in its early period of development. It possesses, even in a more marked degree, the advantages usually ascribed to the climate of Santa Barbara.

No analysis of the water has yet been made, though it is held in

high esteem by the residents of southern California, and by the physicians of Santa Barbara, for its remedial influence in the diseases to which thermal waters of its class are especially adapted. It is reached by the steamers of the Pacific Coast Steamship Company from San Francisco, or by the Southern Pacific Railroad to Newhall, and thence by stage, about seventy-eight miles, to Santa Barbara.

#### WILBUR SPRINGS.

These somewhat noted springs are located in Colusa County, probably about thirty miles from Colusa. The water belongs to the hot sulphur class, and contains carbonate of soda and sulphates.

No complete analysis has been made, but it has attained a reputation in rheumatic and cutaneous diseases, and other complaints to which springs of the kind are usually adapted.

The springs are reached by railroad to Williams, and thence by stage. The location is said to be a pleasant one.

#### SIMMONS' HOT SULPHUR SPRINGS,

Located not far from the above in Sulphur Cañon, in Colusa County. They are stronger in sulphur than the Wilbur Springs, and one is said to have a temperature of about 170° Fahrenheit.

No analysis has been reported.

#### BYRON SPRINGS, CONTRA COSTA COUNTY.

These springs, although but recently brought to the notice of the public, have already acquired considerable reputation. There are said to be numerous springs, sulphurous and saline, hot and cold. Some of them are actively cathartic; others diuretic; some sparkling with carbonic acid; others containing sulphuretted and phosphuretted hydrogen gas. They are said to have been found useful in the diseases to which mineral waters of this kind are usually adapted—in rheumatism, and in renal and hepatic affections.

They are located about a mile from Byron Station, on the railroad from Martinez to Sacramento, and near the base of the Mount Diablo Range, and of easy access from San Francisco or Sacramento.

#### THE GEYSERS.

These springs, about which so much has been written, and which form an object of so much curiosity among travelers from the Eastern States as well as among the people of California, are located in Sonoma County, in a deep gorge of the mountains, through which runs Pluton Creek, and about seventeen hundred feet above the sea. They consist of many springs, numbered by hundreds, extending along the cañon for a distance of a mile or more, the temperature varying from 200° to 210° Fahrenheit. Then, near by, about three or four miles up the cañon, are the "Little Geysers," consisting of several springs, at a temperature of from 190° to 200° Fahrenheit. Down the cañon, only a mile or two distant, are the "Indian Springs," so named from their having been the resort of the Indian tribes of this vicinity, and from which Edwin Forrest, while in California, was supposed to have derived much benefit. They are not original springs, but are sus-

tained by the union of three streams from the Geysers themselves—the sulphurous, the chalybeate, and the aluminous. These springs are much lauded by the local residents for their efficacy in chronic rheumatism. No analysis, so far as known, has been made of the water. Also, unanalyzed, four or five miles up the cañon, are the “Blue Lick Springs,” closely resembling the springs of the same name in Kentucky.

The Geysers, at the present time, are objects of curiosity, rather than of medical interest, though the water of some of them possesses active medical properties—epsom salts springs, iron springs, soda springs, alum springs, and many others in which some ingredient is supposed to predominate. There are also cold water springs, and facilities are afforded for bathing—hot or cold—or these successively.

The late Dr. T. M. Logan, former Secretary of the State Board of Health, in giving the history of the Geysers, remarked :

The name was giving to these springs from their supposed resemblance to the Geysers of Iceland, though it would require a very vivid imagination to see any marked resemblance. The Geyser Cañon is half a mile long; the bottom, from one or two rods in width, and the banks shoot up one thousand four hundred feet at an angle of 45°. Here and there, at wide intervals, are small jets of steam from springs, which are bubbling and hissing in all directions. One spring, called the “Devil’s Inkstand,” contains dark precipitate of sulphuret of iron, that is used to write the registries at the hotel. From one of the large vents in the ground, which is about two feet in diameter, the steam escapes with a loud noise—not unlike that from the escape pipe from an engine—and hence is called the Steamboat Geyser. The steam rises several hundred feet, and is ejected in regular pulsations, as by an engine at work. On the same side of this ravine is the “Witches’ Cauldron,” an unfathomable pool, near seven feet in diameter, filled with a blackish, viscid fluid; of 200° temperature; is continually boiling, and sending forth mephitic vapors. Twelve feet away is the “Intermittent Scalding Spring,” which sends forth jets of water of a temperature of 175°. They sometimes rise to a height of fifteen feet, but the pressure varies at different times. It is the same with nearly all the springs. At no time, however, do the jets cease entirely. As the degree of pressure, and the height to which the water is thrown, vary, so does the sound. There are other wonderful phenomena here, of which it would be out of place, in a report of this character, to enter upon a full description. To give some idea of these wonders, we can only here state that there are springs only a few feet apart, one cold and the other burning hot—springs issuing, apparently, from the same orifice, of waters of different color, smell, taste, and chemical composition. “Here,” in the descriptive language of T. Starr King, “we would turn up a patch of brown, crumbly soil, and find a clay that looks like blue vitriol; near by, under a shelving ledge, is a brisk, bubbling pool, overhung with verdigris encrustings; a few feet off, spurts a beaded jet of hot water, which sheds a dismal brown casting over the surrounding earth; a little way further still, is a spring that looks like pure, hot ink; then we discover a rock of alum that weighs two or three hundred pounds; then a small fountain of epsom salts: not far off, again, a basin of apparently boiling soapsuds; then iron springs, soda springs, white, red, and black sulphur springs; and soon a foul stygian sluice, close to the wall, from which a steam exhales to cover the overhanging earth with slimy deposit, which eats your clothes, if you touch it, as ravenously as aqua fortis.”

The Geysers are easily accessible by way of the Napa Valley Railroad to Calistoga, thence by stage, over a fine mountain grade, or by the San Francisco and Northern Pacific Railroad to Cloverdale, and thence by stage over a route full of interest to the lover of the wild and romantic in nature.

## UNCLASSIFIED SPRINGS.

### HIGHLAND SPRINGS, LAKE COUNTY.

These springs are situated in Lake County, about seven miles from Lakeport and Clear Lake, at an altitude said to be about one

thousand seven hundred feet, free from fogs, and in a climate which, like almost all parts of Lake County, is remarkable for its healthfulness. Good accommodations have been provided for guests in the hotel and in cottages. The springs are of easy access from San Francisco by steamer to San Rafael or Donahue, thence by the S. F. and N. P. R. R. to Cloverdale, in Sonoma County, and thence by stage sixteen miles. No analysis has been made known, so far as the writer is aware.

Other springs have been reported, supposed to possess medicinal virtue. One on the mountain near Silver Lake, in Amador County. It is a cold, saline spring, strongly chalybeate. Professor Price, to whom I am indebted for a knowledge of it, states that it is more highly ferruginous than almost any of the springs of this State.

Another, a soda spring, on the west side of Clear Lake, in Lake County.

Another, a saline cold spring, in the Sierra Nevada Mountains, near Falling Leaf Lake. A quantitative analysis has been made, showing the presence of carbonate of soda, iron, magnesia, and lime.

The Magnetic Spring, near Watsonville.

Mark West Springs, Sonoma County.

Anderson's Springs, Lake County, nineteen miles from Calistoga. There are hot and cold sulphur springs. No analysis known.

Paraiso Hot Sulphur Springs, Monterey County, six miles from the terminus of the northern division of the Southern Pacific Railroad. Said to contain soda, sulphur, and iron.

Piedmont White Sulphur Springs, three miles from Oakland. A pleasant place of resort. No analysis has been made known.

The following analysis has been sent me of what purports to be a mineral water discovered in Inyo County, California :

#### VOLCANIC MINERAL SPRING.

This remarkable spring is said to be located in Inyo County, southern California, in what is called Death's Valley. If genuine it is the most wonderful natural water supply which has ever been brought to the notice of the writer. It is a cold spring. The following analysis, by Dr. Price, has been furnished :

GENTLEMEN: I have made a careful analysis of the five gallons of water you left with me, and below please find results in grains per gallon :

	Grains.
Chloride of sodium.....	1840.72
Chloride of potassium.....	132.30
Carbonate of soda.....	1724.11
Sulphate of soda.....	651.02
Sulphide of sodium.....	46.34
Lime and magnesia.....	traces.
Silica.....	14.28
Organic matter.....	13.48
Iodine and bromine.....	traces.
Iron.....	traces.
Boracic and phosphoric acids.....	traces.
Total.....	4422.25



The water, of which the foregoing is an analysis, is a very remarkable one, being at once a sulphur, salt, carbonate, alkaline, and slightly ferruginous water. The digestive and urinary organs are specially affected by alkaline waters; the liver and the alimentary canal by saline ones. The skin and mucous respiratory membranes are, according to the best medical authorities, influenced by sulphur waters, while a special action on the blood has always been attributed to ferruginous sources.

When used either internally or externally, it is directed that the water be diluted with pure water. Internally, the dose is fixed at a teaspoonful in a wineglassful of water; externally, it is mixed with one or more parts of water.

In its pure state it has a bitter, saline, and acrid taste. It is highly praised for its curative properties in rheumatism, catarrhal affections, diseases of the kidney and liver, dyspepsia, and neuralgia. It is powerfully purgative with some, but with others, not at all so.

This completes the record of the mineral springs of which any authentic account has been received.

Some of the dangers incident to the prevailing fashion of using our mineral waters have been briefly alluded to, as well as some of the reasons for the distrust which has prevailed with many as to their efficacy in disease, and for the reluctance of many physicians to recommend them. All of these objections could be to a great extent corrected by legislative action, in authorizing a reliable analysis of such as are brought prominently before the public. A small sum applied to this purpose, under the control of the State Board of Health, by whom selections of water for the purpose should be made, would enable them to dispense valuable information to those wishing to visit these sanitary resorts.

The mineral springs of California ought to assume their legitimate place as instruments, either of evil or of good. They deserve investigation, and the public should be instructed as to their use. This can be done only when their constituents are accurately determined. When this is accomplished, those that possess a real value will continue to command confidence; while the worthless may be exposed.

This much, it is believed, is demanded in the interest of the public. The expenditure of even a small sum in this direction will redound greatly to the benefit of the State, and assist in developing one of its prominent and really valuable interests. It is not pretended that an analysis alone can be an infallible indication of the therapeutical value of mineral waters. As before stated in this paper, *experience* affords the only positive evidence. Yet, chemical analyses, by revealing to the physician the presence of ingredients with whose special effects he is familiar, will enable him to form correct general views of the action of the water, and serve to prevent, as remarked by a distinguished author upon the subject, "The incessant mistakes and mischief which medical men commit in sending their patients, *haphazard*, to drink mineral waters which are often unadapted to their cases." Analysis—a knowledge of the mineral combinations existing in these waters—added to the experience we are every year acquiring in their use, will give them a practical value, and establish their reputation upon a basis which, without it, they can never attain.

It may be said that the mineral springs are private property, and should be developed by private enterprise. This is true. But the action of individuals is uncertain, and while we are waiting for its determinations the interests of the public suffer. There is, besides,

no guarantee afforded of the reliability of the analyses thus procured. They may be reliable, or they may not. Doubtless a considerable number of those already made have been done by competent hands, but of some, we have reason to believe that the representations made are simply conjectural; nor can we be sure that due care will be exercised in this regard in the future. An analysis, unless trustworthy, is worse than useless. It misleads those who should, least of all, be the subjects of deception.

# THE CITY OF SACRAMENTO—ITS SANITARY CONDITION.

BY F. W. HATCH, M. D.

The Capital city of California deserves more than the passing notice it has commonly received in the reports of the State Board of Health. Its location in or near the center of the great central valley of the Sacramento and its extension southwardly—the Valley of the San Joaquin—establishes it as a fair point from which the climate of this whole valley region, from Redding, in the north, to Caliente, in the south, at the base of Tehachapi Mountains, may be studied. It occupies a medium position, in respect of climate, and, in all essential features, in its relation to disease. As we go north, towards the foot-hills in Shasta County, the Summer temperature at midday is slightly warmer, and the thermometric range between the hottest part of the day and nine o'clock p. m., is less marked, in consequence, to a great extent, of the slighter influence of the southerly winds, which, at Sacramento—without discussing the question whether these winds arise in the valley or at the Golden Gate—are commonly felt to come in from the Bay of San Francisco during the latter part of the day. Far south, in the lower part of the San Joaquin Valley, a similar difference is observable, due to the same causes; yet, in the latter case, the winds come from a northerly direction, yet from the same source. Along the whole of this extent of country—a distance of perhaps five hundred miles—malarial fevers constitute the prevalent forms of disease; malarial influence affects and modifies almost all the diseases usually brought under the observation of the physician.

TABLE

*Of mean temperatures and humidity, at Sacramento, 1879; Visalia, 1879; and Red Bluff, 1879.*

MONTHS.	SACRAMENTO—1879.				VISALIA—1879.				RED BLUFF—1879.			
	Mean temperature.	Mean maximum.	Mean minimum.	Mean humidity.	Mean temperature.	Mean maximum.	Mean minimum.	Mean humidity.	Mean temperature.	Mean maximum.	Mean minimum.	Mean humidity.
January	45.9	57.4	33.8	68.4	43.7	53.8	34.7	73.0	44.3	53.7	35.1	64.8
February	53.6	65.8	43.9	79.5	54.6	64.5	43.9	69.3	53.0	61.8	44.6	68.8
March	57.07	68.8	48.1	84.8	60.1	72.6	47.6	59.2	56.8	65.5	48.0	70.2
April	60.8	73.6	49.3	81.3	62.0	73.6	49.3	56.6	61.5	71.9	50.9	59.4
May	60.5	74.2	48.6	76.4	64.6	77.3	45.1	50.2	62.8	75.2	51.2	50.8
June	73.6	88.5	57.1	66.7	78.5	93.9	58.0	33.3	79.3	91.8	64.7	29.9
July	73.1	89.6	55.5	75.8	81.2	97.9	59.3	33.5	82.6	95.9	66.3	31.1
August	75.2	92.3	57.8	72.5	83.5	100.5	62.	31.0	83.8	98.9	67.7	31.6
September	70.3	86.0	54.1	77.4	74.7	91.6	58.2	42.9	77.2	91.7	61.6	34.4
October	58.8	75.5	46.1	79.9	60.2	77.8	46.7	59.1	63.1	77.5	52.0	48.2
November	49.2	62.4	38.6	82.1	49.5	62.9	39.4	71.8	50.8	62.1	42.0	63.1
December	43.4	54.4	35.1	83.7	44.9	54.2	37.3	80.8	44.6	53.0	37.2	73.4

The region described embraces some of the most fertile districts of California, grain of every kind growing luxuriantly, while fruit trees of all varieties—even the orange and the lemon—are cultivated successfully, without protection. The meteorological features of this extensive range of valley land, are sufficiently explained by the tables for the three stations of Red Bluff, in the north, Sacramento, in the central portion, and Visalia, in the south.

The statement for Visalia has been furnished through the courtesy of the Army Signal Officer of that place. For that relating to Red Bluff, I am indebted to the office of the Chief Signal Officer, Washington, D. C., obtained through Sergeant Frantz, U. S. A., of the Signal Corps, at Red Bluff.

It is not designed, at the present time, to analyze minutely the climatic features or sanitary relations of the vast scope of country included in the valleys of the Sacramento and San Joaquin. The foregoing remarks were intended to convey only a very general idea of the interesting region of which Sacramento may be considered the center; and in regard of the latter, what is said will have reference mainly to its present sanitary condition, some of the causes which affect the health of its population, and its water supply.

In the early days of Sacramento, its location was, perhaps with some justice, considered one of the most unhealthy in the State. This impression originated with the prevalence of cholera in eighteen hundred and fifty, when there was a frightful mortality among the early settlers. The city was at that time the stopping point for the vast tide of immigration pouring in across the continent. Many came here sick, reduced in health by obstinate, chronic diarrhea, or broken down by scurvy. Their mode of living, their reckless disregard of all sanitary laws, were such as to encourage disease, while the locality of the city at the junction of two rivers, itself low, and surrounded by swamp lands, subject, too, to overflow, made it a favorable place for malarial diseases of every kind.

As late as eighteen hundred and fifty-two, the mortality by diarrhea and dysentery amounted to one hundred and fifteen, from cholera, to one hundred and two, and from malarial fevers, to one hundred and forty.

In eighteen hundred and seventy-eight, the mortality in the city, with a population larger by some thousands, was for diarrheal diseases, only nineteen, and for fevers, malarial and typhoid, only twenty-seven.

The reputation acquired for unhealthiness at this early day, has clung to the city, with those who are ignorant of its condition now, and for some years past, even to the present day.

With a more settled state of society, with what might properly be called the era of permanent homes and contented households, attention was aroused to the improvement of the sanitary condition of the city. One of the first steps taken was to raise the entire business portion of the place out of the low plain on which it stood, by blocking up the houses and filling the streets with earth. As a measure to protect the city from the danger of floods from the overflowing rivers, it gave confidence and stability to the business interests, but in a sanitary point of view it occasions some of the most serious evils which have since existed. Allusion is made to the low and shut-in condition of the lots and cellars in the raised portion of the city. These low lots became at once reservoirs for the collection of the

Winter rains and the seepage from the river—the latter often continuing until late in the Spring. They were the receptacles, too, of filth of various kinds, and there being no possible drainage, they became the source of offensive and pernicious exhalations. The system of filling in the streets was gradually extended, and is being pursued to the present day; the earth used for the purpose being a sediment, rich in decayed and decaying vegetable matter, washed down from the mountains into the river beds during the rainy season. The same material is used for filling in low lots and wet and offensive basements, under order of the City Board of Health. The ultimate effect of these measures has been greatly beneficial.

The immediate connection between the deposition and exposure of this sediment upon the streets and into the cellars, and an increase in malarial disease in the vicinity, has been too evident to have escaped the notice of the most careless observer. The system, too, of sprinkling the streets during the Summer months has increased the trouble. Doubtless this evil will in time correct itself.

Meanwhile, an effort has been made to improve the drainage of the city by a plan fully detailed in the last report of the State Board of Health. It consists, in general terms, of earthenware or cement pipes laid from north to south through the city on alternate streets, side drains connecting with these, and the whole ultimately discharging into a canal, which after a course of twenty-five miles or more, empties into a slough or lake; from thence it flows into the Sacramento River. Although the fall or decline of the sewers is only six inches to the block of three hundred and twenty feet, or, including the alley, of three hundred and forty feet, and of the canal from the southern line of the city to the slough only from five to six inches to the mile, it is the most that, under present circumstances, can be obtained; and it is thought by the engineer to be sufficient to carry off the accumulating sewage. The reflux of the latter through the canal, and thus into the sewers during the high stage of the water in the river and slough, is provided for by a floodgate and a cross levee. The sewerage on this plan is being gradually extended and improved.

Yet, the drainage from lots and yards is defective and a serious source of danger to health. In some cases the lots are too low to admit of drainage, and where these are occupied by families, the waste water from the house and kitchen is either thrown upon the surface to saturate and pollute the soil, or drained into uncemented cesspools. Sometimes the same cesspool is used as the depository for the kitchen slops and for the contents of the water-closet, or, in the absence of the latter, a privy is erected over it.

In a very large majority of cases throughout the city, however, the privy is a mere hole dug a few feet in the ground, designed to be used until full, when it is to be covered over with earth and another dug near by. In other yards, and for the use of those occupying more finished residences, and for the best hotels, cesspools have been prepared for the reception of the waste from water-closets. These are, for the most part, excavated in the earth for a certain yet varying depth, loosely bricked or boarded up, the intention probably being entertained of having them emptied when required, or when the accumulation is greater than the natural process of percolation through the soil can readily relieve. In very many cases, unfortunately, this is seldom thought of, until, in consequence of foul odors, a nuisance is created, which receives the attention of the Health Officer. In some

instances the cesspools are located in the cellar, permitting the escape of offensive gases into the rooms above. From some familiarity with many of the residences and hotels in Sacramento, the writer is able, knowingly, to say that very many of the closets are unsafe; they are badly constructed; for the most part cheap and inefficient concerns; and seldom properly ventilated. This is the fault, doubtless, in many instances, not so much of the owners of the dwellings as of the plumbers upon whom they rely.

An attempt was made in the last report of the State Board of Health to explain the evils of the conditions thus briefly pointed out—the danger of permitting the percolation from cesspools to go on from year to year; for, though oxidation did undoubtedly take place in the soil, effecting the destruction of organic matter, and its conversion into harmless nitrates and nitrites, there was a limit to this conservative influence of soil; it became, after a time, supersaturated, when chemical reaction was impossible. This state of things, so far as regards privies, has been going on upon the building lots of Sacramento for at least twenty-eight years—since the Fall of eighteen hundred and fifty-two—when everything visible was destroyed, perhaps purified, by fire. A block of ground, three hundred and twenty feet square, may contain sixteen twenty-foot lots, along each of its sides. If the buildings upon each side were equal, there would be sixty-four lots, and, as a consequence, sixty-four privies, open or vaulted, upon each block. How many times, during twenty-eight years, these privies have been filled, covered over, abandoned, and new ones dug, must be a subject for conjecture only. Imagination may also form something like a clear and truthful conception of the present condition of the soil in blocks arranged as just described, and this, too, in a somewhat low, alluvial soil, where subsoil drainage, though possibly practicable, is difficult, and as yet unattempted. Similar dangers necessarily arise from the cesspools, of which probably not more than two or three—if indeed there are any—have been made water-tight by cement; and in many lots there is one of these in addition to the privy. Upon the subject of subsoil drainage, the Civil Engineer, in a communication published in the report of the State Board of Health, for eighteen hundred and seventy-nine, remarked:

The only remedy for this (*i. e.*, the cold, damp condition of the soil) is subsoil drainage, which could be effected at a trifling cost compared with the cost of raising the surface in low places sufficiently to drain into the sewers, and with the benefit to be derived therefrom. The cost of raising a single block one foot high would require sixteen thousand eight hundred cubic yards of earth; this, at a cost of thirty cents per cubic yard, would amount to one thousand eight hundred and sixty-six and sixty-one hundredths dollars—sufficient, at one dollar per foot, to construct one thousand eight hundred and six tenths feet of drain; or, at two dollars per foot, nine hundred and thirty-three and three tenths feet of drain, which would dry the soil to a depth below the surface depending on the locality. In the vicinity of B, C, and D streets, where the seepage water stands longest on the surface of the ground, the soil could readily be drained to a depth of five feet lower than at present; while in the vicinity of Fifth and P, Q, and R streets some good could be done; but at the latter points the general surface of the ground is so near the level of the water at its outlet that the advantage gained would not be so great. \* \* \* With the subsoil of our city well drained, there can be no doubt but that the benefit derived in its increased healthfulness would more than repay the cost of doing the work; for in many localities there can be no doubt that a large portion of the sickness is caused by the cold, damp nature of the soil.

As our system of drainage is at present constituted, every particle of the rainfall in our city, as also the seepage, and what is pumped into the city, has to escape by evaporation, by absorption, or through the sewers. The result is, that probably during the rainy season nine tenths of the water that enters the city has to be absorbed by the soil and retained until the fall of the rivers, when the heat of the sun becomes sufficient to evaporate it.

A gross and palpable danger to the health of the city has long been permitted to exist in the presence of a "slough," or lake, north of I-street, within the city limits, and but a few steps from its principal business street—a lake daily and hourly befouled by filth deposited into it by the Chinese residents upon its border, and reeking with foul and disgusting odors. There have been times when the water of this lake was incapable of supporting animal life, proving fatal to the fish it contained. The tolerance of such a nuisance by those in authority but feebly reflects the enterprise for which the people of Sacramento are proverbial in all that affects the interests of the city. Fortunately, a project is now under consideration by which this nuisance may be abated, and the locality purified and made attractive.

The subject of water-closets has been alluded to. That many of these are deficient in the qualities that insure safety and efficiency, the most careless observer is capable of detecting. The reliance commonly placed in the water-seal is untrustworthy. It is liable to be unsealed by suction in consequence of a faulty arrangement, and to permit the escape of sewer gas under certain pressures. The ordinary pan closets in common use are apt to become befouled and to be themselves the source of noxious vapors. Yet most of those having in-door water-closets here are supplied with this kind.

For purposes of ventilation it is, in general, sufficient "to carry the soil pipe to the roof, or some other convenient point, care being taken that no windows, house ventilators, or the flue of a chimney shall be near the point of termination." When more than one closet communicates with the soil pipe, the effect of discharging the contents of the upper one, for example, is to create an inward current which will unseal all the lower traps in connection with the soil pipe. This, according to Latham, may be corrected by carrying a separate ventilating pipe from the top of the bend of each trap, either independently to the outside, or to make these ventilating tubes communicate with the open soil pipe above the highest intake into the pipe. A simple arrangement like this, with a good closet, is better than any other yet proposed, and is inexpensive.

A defect more frequently met with than any other, according to the observation of the writer, is one in connection with the bathroom. The water-closet may be of a suitable kind, the soil pipe and drain leading to the cesspool may be properly trapped and ventilated, but the bath-tub and the pipe for the discharge of water therefrom is too often neglected. Yet the bath-tub no less than the water-closet is in connection with the cesspool, and foul air is inevitably forced up as the water flows down.

The same may be said of the sinks conveying water from the kitchen. These connect with the cesspool or with the main sewer. In either case, untrapped, they may become the unsuspected source of disease.

Faulty conditions of the water-closets are all the more dangerous because the gas—sewer-gas it is called—if indeed it be a gas, is generally inodorous. The other foul gases which are generated in sewers—the compounds of carbon and hydrogen, the ammonia, the compounds of sulphur and hydrogen, the carbonic acid, and carbonic oxide, are more or less perceptible to the sense of smell, and serve to warn us of the possible presence of the other agent, the organic *vapor*, or germ, which we have especially to fear. The former are injurious only when present in considerable excess; the latter is subtle, insidi-

ous, and is supposed to work out its deadly mission even when inconsiderable in quantity and greatly diluted by ventilation.

It is this inodorous air, which the chemist has been as yet unable to detect, and of the reality of which we are assured only by its results, that affects the health of those exposed to its influence, probably by lowering its tone, and rendering the system susceptible to the reception of disease; or, under certain favorable circumstances, as the carrier of those specific germs which, it is believed, are the parent of typhoid fever, or cholera, and perhaps other forms of diarrheal disease.

Yet with these very evident defects—these violations of hygienic rules, the sanitary condition of the city is good, and the death-rate by no means discouraging. This is conclusively shown by the mortality record for the year ending June thirtieth, eighteen hundred and eighty.





## III.—Local Diseases.

Pneumonia	35	25	10			4	6	1	1	4	3	5	7	4		12	11	12	
Pleurisy	0	0																	
Bronchitis	5	4	1			1	1		1	1	1	2	1			2	2	1	
Other diseases of respiratory organs	18	9	9			6				1	2	2		4	3	4	8	6	
Enteritis	9	6	3			5			1	2			1			5	3	1	
Gastritis	1	0	1								1							1	
Gastro-enteritis	1		1																1
Peritonitis (non-puerperal)	9	4	5			2			3		2	2				4	4	1	
Diseases of liver	7	4	3							1			5	1		2	4	1	
Other diseases of stomach and bowels	12	8	3			1	5	1				1	2	2	1	6	1	4	1
Bright's disease and nephritis	9	7	2			1		1		1	1	2	1	2		2	5	0	1
Aneurism	3	2	1									1	1	1		1	2	1	
Heart diseases	15	10	5			1		1	2	2	2	2	5			2	4	8	1
Convulsions	7	5	2			2	3	1			1					6	1		
Other diseases of brain and nervous system	23	13	10			1	2	1	2	2	2	2	7	4		7	13	3	
IV.—Developmental Diseases.																			
Puerperal diseases	6		6						2	3	1					2	3	1	
Old age	11	5	6											11		1	6	3	1
V.—External Causes.																			
Suicide	4	3	1							1			2	1				3	1
Heat, death from—sunstroke	0																		
All other causes not classified	101	75	26			9	6	3	3	17	15	16	13	11	8	28	20	47	5
Stillbirths	18	5	7			6													
Totals (stillbirths excluded)	424	254	160	10	65	40	15	34	62	46	47	56	45	45	14	100	120	130	14



## III.—LOCAL DISEASES.

Pneumonia	35	25	10	2	1	4	3	4	3	8	3	4	3
Pleurisy	0	4	1	—	—	—	—	—	—	—	—	—	—
Bronchitis	5	9	9	—	—	—	—	—	—	—	—	—	—
Other diseases of respiratory organs	18	9	3	2	2	1	6	4	1	—	1	—	—
Enteritis	9	6	—	—	—	—	—	—	—	—	—	—	—
Gastritis	1	—	1	—	—	—	—	—	—	—	—	—	—
Gastro-enteritis	1	—	1	—	—	—	—	—	—	—	—	—	—
Peritonitis (non-puerperal)	9	4	5	1	1	—	—	—	—	—	—	—	—
Diseases of the liver	7	4	3	—	—	—	—	—	—	—	—	—	—
Other diseases of stomach and bowels	12	8	3	1	1	1	2	4	1	2	1	—	2
Bright's disease and nephritis	9	7	2	2	2	—	—	—	—	—	—	—	1
Aneurism	3	2	1	—	—	—	—	—	—	—	—	—	—
Heart diseases	15	10	5	—	3	1	1	3	1	3	1	—	1
Convulsions	7	5	2	—	4	—	—	—	—	—	—	—	1
Other diseases of brain and nervous system	23	13	10	1	5	2	2	1	—	—	—	2	2
IV.—DEVELOPMENTAL DISEASES.													
Puerperal diseases	6	—	6	1	—	—	—	—	—	—	—	—	—
Old age	11	5	6	2	—	—	—	—	—	—	—	—	—
V.—EXTERNAL CAUSES.													
Suicide	4	3	1	—	—	—	—	—	—	—	—	—	—
Heat, death from—sunstroke	0	—	—	—	—	—	—	—	—	—	—	—	—
All other causes not classified	101	75	26	11	10	3	12	6	6	15	9	10	6
Stillbirths	18	5	7	6	2	1	4	2	1	1	1	1	2
Total (stillbirths excluded)	424	254	160	32	34	30	50	48	40	36	38	27	21

Estimating the population in accordance with the report of the U. S. Census Marshals for the present year, at 21,500, we find a death-rate of 19.7 per 1,000; apparently a pretty large excess over other years. During the latter part of eighteen hundred and seventy-nine, typhoid and typho-malarial fevers were uncommonly prevalent, not alone in Sacramento, but over a large portion of the State. Eleven deaths are ascribed to typhoid fever alone in October, eighteen hundred and seventy-nine, a circumstance without a parallel in the history of Sacramento. Five occurred in November, and only *seven* for the remaining ten months of the year embraced in the report. There must have been some local cause for this sudden outbreak of fever; and I have already called attention to the condition of the cellars and low undrained lots as a probable cause of disease; also, to the sediment from the bed of the American River, used for raising both streets and cellars—a sediment rich in vegetable matter. It is quite probable, from facts coming within the knowledge of the writer, that there was an error in diagnosis in several of the cases, and that these cases should have been classified as typho-malarial form rather than the specific form under which they appear. True enteric fever occurs in Sacramento; but it is rare in comparison with typho-malarial, or even with what, in the judgment of the writer, should be classed as “cess-pool fever.”

From November, eighteen hundred and seventy-nine, to May, eighteen hundred and eighty, pneumonia prevailed epidemically, the mortality by this disease reaching as high as eight in March. Many elderly persons fell victims to the disease.

It has been customary for a year past to estimate the population of the City at 25,000. We are now compelled to submit to the decision of the Census Marshals.

Sixty-five deaths occurred among children under one year of age. Estimating the living births during the year to have been 356, as reported by the School Census Marshal, we find the death-rate among infants under one year to have been about 18.2 per cent. of the births; or 182 per 1,000; or 1 in 5.4.

Of the total population, the death-rate among infants under one year was 3.02 per 1,000 of population per annum, the same under five years was 4.8 per 1,000. By the following, which may be considered the principal zymotic diseases affecting infants, viz.: cholera infantum, diarrhea, smallpox, measles, scarlatina, diphtheria, whooping-cough, and the fevers, the death-rate under one year would be 0.77 per 1,000 of population; or, calculating the result from the total mortality at all ages by the above zymotic diseases, we have 2.69 per 1,000 of population. This is more than it should be in localities in which proper sanitary regulations are observed.

The mortality among infants in a city bears a certain significant relation to its sanitary condition, and the attention paid to the maintenance of a good hygienic system. When excessive, it is an indication that there is something wrong, something that needs correction, not only to save infant life directly, but also to protect those who survive for the time against the debilitating influence of insanitary conditions which will affect their future health, and render them fit subjects for disease. It can scarcely be a question, that most of the diseases enumerated above, as selected from the zymotic class, are to some extent preventable. Most of them depend upon neglect—upon an imperfect hygienic management. Some arise from errors of diet

permitted by those who are their natural protectors; some from errors of clothing and exposure; some from faulty arrangements of the dwelling—the closets, sinks, and drains; some—the contagious diseases—from neglect to observe the proper precautions in regard to exposure to contagion, whether at home, or by the interchange of social visits to infected houses, or in the school room. There can be scarcely a doubt that diphtheria is often communicated by the latter means, in consequence of the habit among parents of permitting their children to mingle with their associates in the school room or the play-ground, while still the subjects of mild attacks, or too soon after recovery, or without proper disinfection of clothing. The same is true of other contagious diseases. These truths are matters of universal recognition among sanitary authorities; they are almost as universally disregarded by those for whose benefit they are taught.

If we include among our review of the mortality of Sacramento for the past year, the deaths among infants under five years of age, and compare them with the population under that age, we have a more favorable showing. The population being one thousand seven hundred and fifty-four, and the deaths by the zymotic class of diseases, thirty-five, we have a death rate of 19.9 per thousand, or 1.9 per cent.; or, taking the total deaths under five years, and the total mortality at all ages, 4.8 per thousand.

It is to be noticed that the excess of deaths in Sacramento is due, in part, to malarial, or remittent and intermittent fevers. The malarial element, as already mentioned in this report, is a constant one. It appears to be inseparably connected with the topography of the valley, and the diseases arising therefrom, though theoretically preventable, and due, in fact, to conditions greatly within our control, are not now absolutely so. It may easily be shown how great an improvement has been effected in this regard during late years, and there is reason to believe that a still greater advancement is not only possible, but, with the completion of measures for obtaining a better drainage and sewerage system, and for filling in low places, quite certain. Statistics of mortality show the gradual abatement of malarial fevers of all kinds, not only in the city itself, but in the neighboring country. They show that with the progress of cultivation and improvement, with the advances already made even in our present sewerage system, with the filling in of low lots, cellars, and streets formerly subject to overflow, even though the material used for this purpose has been the probable cause of a temporary increase in intermittent and remittent fevers, and the so-called typhoid fevers, the annual mortality from these diseases, if we except one or two years when special causes were in operation, has steadily declined. If we could eliminate from the fevers proving fatal here, the malarial element, the deaths by this class of diseases would be greatly reduced. But, even during the past year the mortality by intermittent and remittent fevers was only .4 per thousand population. Yet, there are those who, looking only at the liability to these fevers, seem to be still inspired by gloomy forebodings as to the future healthfulness of Sacramento. The recollections of the past, and its disasters by flood, linger as the phantoms of an unpleasant dream; they fail to look beyond the fact of the chill and fever of which they may have been the occasional victim; they predict the failure of any system of drainage or sewerage; they point to marks upon the sycamore trees along the river where floods are said to have risen during the

memory of the oldest settler, and they see no remedy for the other defects of which we have ventured to designate a few of the most prominent.

Let those who thus despair read the following comparison of death-rates among children under one year of age, to the total mortality in different cities and countries: England and Wales, rate of mortality under one, 21.24 per cent.; under five, 44.53. London, 1871-78, under five, 73.8. New York City, 1866-72, under one, 30.5; under five, 50. Cincinnati, 1867-73, under one, 25.5; under five, 48.1. Cleveland, 1873, under one, 29.5; under five, 49.1. Boston, 1877, under one, 24.82; under five, 40.94. San Francisco, 1879-80, under five, 30.2. Los Angeles, 1879-80, under five, 31.8. Marysville, 1879-80, under five, 9.3. Sacramento, 1879-80, under one, 12.9; under five, 24.7.

We need for Sacramento a plan for underground or subsoil drainage, perfected under the best engineering skill.

The Board of Health should have more power, and more means at their disposal to abate nuisances—to order and compel the cleansing of cellars, and their being filled up where necessary, and to require the alleys, many of which are now filthy, to be cleaned. It should be their duty to inspect plans for new buildings, public and private, as to their sanitary arrangements—the water-closets, lavatories, baths, sinks, and drains.

No new cesspools or vaults should be permitted to be dug within the city limits, unless the same are tightly cemented, and the Health Officer should see that they are emptied and cleansed at proper intervals; and the common practice of erecting privies over shallow excavations, or even upon the undisturbed soil, as is now the practice in some places, should be prohibited. We would thus be able to obtain security for the future, even though we might not altogether correct the evils of the past.

It would certainly be in the interest of a city like this to own an odorless excavator, to be employed for the public benefit at small or cost price. The objection urged against this useful contrivance, is a pecuniary one arising from the cost of its services; but if supplied by the city at a price within the easy reach of all, it would supersede all other less objectionable methods of accomplishing the purposes for which it is so admirably adapted, and the mode of cleansing and purification of the many receptacles of filth would be more likely to be accomplished.

The "dry earth" system of closets, so warmly advocated by Mr. Waring and others, and which was explained in the last (1878-79) report of the State Board of Health, would form an excellent substitute for the water-closet or privy, by the use of which the excreta are efficiently disinfected and made safely removable. The product is a valuable fertilizer. But for the inconvenience in obtaining earth of proper quality, it might be well adapted for private families, who might thereby escape the dangers inevitably attendant upon cesspools when having drain-connections with the dwelling.

Too much stress cannot be laid upon the importance of ventilating the sewers and the water-closets. The former is a duty imposed upon the city authorities; the latter requires the attention of the individual. Equally essential is the duty of providing for thoroughly flushing the sewers, at regular and not too remote intervals.

A custom, detrimental to the health, prevails with some property owners, of covering and surrounding their grounds with too many

evergreen shade trees, thereby shutting out the sunlight both Winter and Summer. This is particularly objectionable for dwellings facing the north.

In the Summer season a moderate shade is grateful and healthful, and then the heat and light of the sun are generally sufficient to penetrate the shrubbery and reach the in-door air. But, even at this season, the work of adornment and shading is too often overdone, and the bright sunlight is to a very objectionable extent excluded, the air within being kept damp and vitiated. In the Winter, when the sunlight is most needed to purify and dry the atmosphere of our houses, and even the walls, if they are of brick, the evergreen foliage surrounding them acts as an effectual barrier. Even the soil, saturated by the Winter rains, and the atmosphere it contains is rendered impure, and in this state enters the house, adding to the dampness already existing there. There is a musty odor about such houses which even raising the windows only measurably relieves.

In such cases the front of the house, facing north, is the most shaded; the morning sun almost never penetrates it; and here are commonly the principal sleeping apartments and sitting rooms. If there are children, and the nursery is thus shaded, they blanch and droop almost like the exotic plants which, under such circumstances, strive in vain to grow and bloom. Scrofulous diseases flourish in the shade and dampness; the pure sunlight fortifies the youthful system against hereditary phthisis. It is among such homes that diphtheria delights to roam.

The soil upon which most of the dwellings in Sacramento are built is damp. The location of the town and the character of the soil itself render it almost necessarily so, in the absence of any system of sub-soil drainage. From this soil damp air is constantly arising, and finds its way into our houses. If, as often happens, the soil, besides being made damp by the ground water, is rendered impure by contaminating substances, to some of which allusion has been made, the escaping air must also be impure, and the situation is even worse.

From cellars a damp air is continually escaping into the rooms above, and as the cellar is often used as the receptacle of refuse of vegetables and other destructible substances, it carries with it the effluvia arising from these sources. In the Winter season, when fires are maintained in the upper rooms, the upward current is rendered still more vigorous.

Brick houses, particularly in Sacramento, should have a damp-proof course laid in the walls a foot above the ground. This may be of any impervious material—asphalt, zinc, or, better, of perforated vitrified stoneware—serving for purposes of ventilation, as well as to prevent the ascent of the ground water. If, with this protection of the walls, the cellars were drained and well cemented, the evils under which so many now suffer would be reduced to a minimum.

It is beyond question that much sickness is occasioned here by the conditions above alluded to.

The importance of a sufficient supply of pure water for every city and town, and some of the difficulties in the way of its attainment, were considered at some length in the last report of the State Board of Health. Facts bearing upon this subject, reciting the evils arising from the use of impure water—of water polluted by percolation from cesspools, or by foul substances resulting from the drainage of towns or individual settlements into streams used for a supply, have been



so often repeated during recent years, and have, by striking demonstrations, been made so manifest, that it would seem to be almost unnecessary to allude to the subject at this time. Especial reference was made to the water supply of the City of Sacramento, which was shown to be constantly exposed to imminent danger of pollution from the drainage of towns along the river above the city, and after an overflow, from the receding of the water from the sloughs and low places in the early Summer, saturated with the results of vegetable decay. It was shown that the only escape from the disastrous effects of this almost constant stream of filth of which the river has been the repository, was not so much through its oxidation, and the consequent purification of the water in its course from above, as in the modifying agency of dilution, and that though all the filth received and held in solution or suspension remained unchanged in the water, even as it was delivered at our doors and drank by our citizens, its disgusting features were softened and rendered tolerable by the smallness of the amount used by any one individual. However unpleasant, therefore, might be the reflection that we were compelled to drink so uncertain a compound, we might take consolation from the fact that it came to us in so attenuated a form as to do us no serious harm.

Analysis, too, made by a competent chemist, showed conclusively that evidences of pollution, though present to a small amount in each gallon of water, were so inconsiderable in the daily potations of people as to deserve no serious consideration; that they were present in no greater quantity, in fact, than was permissible in water properly considered *good*. In the opinion of the writer, after careful study and consideration of the subject, the water of the Sacramento River when deprived of its suspended *mud*, is, for the greater portion of the year, unexceptionally pure. In certain seasons, or after a Winter of heavy rains, when the water thrown upon the sloughs and compelled to remain there for months under a hot sun, finally recedes into the river, it has taken up an amount of vegetable matter, which, while it lasts, is not only offensive to the taste, but likely to be productive of disease.

But the question naturally presents itself: How long, admitting the present good quality of the water, will it so remain, in view of the increase of population along its banks, and the consequently increased supply of sewage it will receive? The danger, too, from the American River, is not to be overlooked.

Even were this answered satisfactorily, and the laws in relation to the pollution of rivers were strictly enforced, the objection still remains to the physical character of the water—its muddy and disagreeable appearance during the greater part of the year.

A sufficiency of clear water for the city has long been regarded as a necessity. The influence of the present muddy and unattractive supply has been bad, disgusting to strangers, and a reflection upon the enterprise of the people. Filtering works, upon a large scale, might be successful, but they have been thought too expensive, and require more care than they would be likely to receive.

A step in the right direction was made during eighteen hundred and seventy-nine. A well was sunk in the old bed of the American River to the depth of sixty-nine feet. Clear water was obtained, but it was determined by analysis to be unfit for use.

More recently, private enterprise has obtained clear water at vari-

ous depths, affording encouragement for the belief that an abundant supply is within reach.

Analysis of a sample of water from three of these wells has been made with the following result:

No. 1. A deep well on K street, bored to the depth of one hundred and twelve feet, and tubed one hundred and twelve feet.

No. 2. A well at M and Twenty-eighth streets, one hundred and forty feet deep, and tubed above one hundred feet.

No. 3. A flowing well on the Sanborn ranch, about three miles from the city, bored to the depth of one hundred and eight feet, and tubed about eight feet.

	Solid residue, grains per U. S. gallon.	Hardness, grs. carb. lime in U. S. gallons.	Free ammo- nia, parts in 1,000,000.	Albumenoid ammonia, parts in 1,000,000.	Weight chlo- rine in U. S. gallon.	Nitrates and nitrites, parts in 1,000,000.
No. 1.-----	14.2	7.2	0.05	0.005	1.76	0.52
No. 2.-----	26.4	5.4	1.26	0.115	4.54	0.78
No. 3.-----	21.1	9.1	0.02	0.02	3.03	0.70

Judged by accepted standards, Numbers One and Three must be considered good waters, preference being given to Number One, while Number Two should be regarded with great suspicion, containing so large an excess of free ammonia and albumenoid ammonia, probably its utmost limit compatible with safety in any water of nitrates and nitrites, and a suspicious quantity of chlorine. The combination of an excess of all these important factors ought to condemn it as far as any chemical analysis can do so.

Numbers One and Three being good waters, the important question to be determined is as to the supply. Is it sufficient for the present and future wants of a city containing now nearly twenty-two thousand inhabitants, and rapidly growing?

The answer to this question, so far as the writer is concerned, is conjectural only. A similar system for the water-supply has recently been adopted in the Town of Alameda, where, by means of an engine, an abundance of pure, clear water is pumped from four artesian wells. The enterprise is a private one, and its success is said to be well assured. It is not improbable that the same thing can be accomplished for Sacramento.

# THE INHERITANCE OF PULMONARY DISEASE;

ITS POSSIBLE ERADICATION, WITH ESPECIAL REFERENCE TO THE CLIMATE OF  
SAN DIEGO.

BY H. GIBBONS, SR., M. D., PRESIDENT CALIFORNIA STATE BOARD OF  
HEALTH.

One of the most interesting and important problems relating to human health and life, is the question: How far is it possible to control and eradicate the hereditary tendency to pulmonary consumption by hygienic, climatic, and other agencies? The danger of transmitting the seeds of this disease to the offspring is so universally conceded as almost to debar persons of consumptive families from the enjoyments of matrimony. It is assumed that the progeny of such parents, or some of them at least, must fall victims to the disease, and that men and women have no right to bring into the world an imperfect offspring, doomed to a life of suffering and a premature death. So powerful is the law of pulmonary heredity as to warrant the conclusion that it can not be averted by any means within the reach of people generally. The discovery of any such means, medicinal or hygienic, would not be less valuable to mankind than the discovery by which small-pox was disarmed of its chief terrors.

The study of climates in relation to pulmonary disease, which now engages the attention of a large number of capable observers, promises results of great value. Certain climates are recognized as favorable and others as unfavorable to the development of those diseases. In many cases it is impossible to distinguish between the effects due to a new climate and those resulting from the removal of an invalid from an old to a new abode. Only close and continued observations, multiplied and accumulated, with the most cautious and deliberate inference, will lead to conclusions that can be relied on with regard to the climate of any locality. It may be safely asserted that this rigid method has not been hitherto applied. Writers in general have rushed to conclusions hurriedly, based on narrow views of the subject, and not always free from local bias. It follows that, although thousands of pages have been printed, with countless figures and facts, respecting the influence of different climates all over the world on pulmonary diseases, the subject is still involved in uncertainty and contradiction, and our knowledge of the adaptation of the various climates has not gone far beyond the limits of probability. The collected materials are valuable for future use, but most of the deductions are little more than wasted ink.

The purpose, however, of this brief paper, is to direct attention to an experiment, as it may be called, now pending in San Diego County, which will tend in some degree to determine how far a favorable climate can repress the inheritance in question. During the month of August, eighteen hundred and eighty, Dr. Hatch and

myself spent several days in that locality gathering information on climate, etc., under appointment by the Governor, with a view to the choice of a site for a State Hospital for Consumptives. We were not long in discovering that a large proportion of the persons whom we met had come there on account of ill health, mostly of a pulmonary character. Many had left their homes in the East and North in a condition of advanced disease, reported as hopeless of other than temporary relief, and were now completely restored. This was the case particularly with individuals who had gone to work and fitted up for themselves and their families homes in the country, with gardens stocked with all kinds of fruit trees, which spring from that soil almost as by magic. When California was first occupied by Americans, San Diego was an old Mexican settlement, on the river of that name, near its mouth. With a view to commerce, the new occupants chose a locality on the harbor, several miles distant from the old town, and more exposed to the ocean. The prospect of making this the terminus of a great railroad across the continent, brought a considerable number of speculators in lands. But the railroad was not built, the speculation failed, and immigration ceased, emigration taking its place. Very soon, however, the climate of San Diego gained a sanitary reputation, and the immigration of consumptives and other invalids began. This was fifteen or twenty years ago. Since that time a new population has sprung up, drawn largely from a tubercular or consumptive stock, consisting mostly of families, parents and children. It is doubtful whether there can be found elsewhere a population more extensively contaminated with the tendency to pulmonary disease, and better fitted to work out the problem which has been referred to.

For a general description of the topography of San Diego and its surroundings, I will refer to the report of Dr. Hatch, Permanent Secretary of the Board, who took that subject under his especial charge. A few remarks on the subject will be, however, germane to the purpose of this paper.

For several miles inland from San Diego, the surface has a gentle slope towards the mountains, and appears nearly level, except when it is broken by several narrow valleys. In these valleys the soil is moist, and small streams are sometimes found in them. The tableland, which is called the "mesa," has hitherto been avoided by settlers, because of its dry aspect, or rather on account of the inviting appearance of the valleys. But the discovery has been made recently that the soil of the mesa land is quite productive, and in favorable seasons even better adapted than the valleys to certain kinds of vegetation. Very probably it will be found more favorable to health also. In this case the sanitary reputation of the region will be still further enhanced.

The average rainfall at San Diego for a series of years is about nine inches, though sometimes only half this much occurs. On the highlands eastward and on the mountains, it is, without doubt, greater, as a large quantity of water pours down from that direction in the rainy season. We may reasonably suppose that a part of the mountain rainfall finds its way beneath the surface down the gentle slope toward the ocean. This would give promise of artesian wells. There is in fact an artesian spring on the narrow promontory which separates the bay from the ocean, four or five miles from San Diego. At this spot a large volume of fresh water rises through the sand, near the

ocean level. For many years it has been resorted to by coasting vessels in want of a supply. Should it be found that water is easily attainable on the mesa lands, these lands will furnish healthier abodes for consumptives than either the town or the valleys to which the population has hitherto been confined.

San Diego has emphatically an ocean climate. But, moist as it is, it enjoys that happy medium of temperature which disarms it of the chilling influence of cold on the one hand and the enervating effect of heat on the other. Receding from the bay, the moisture diminishes, and the temperature in Summer increases always, and in Winter is less uniform, being colder at times, if not generally. But the Winter in California, especially in the southern part, is always short, and has the character of Spring.

In one of our rides, a few miles from the city, we were informed that we should meet with an aged lady, who had come from the East some years ago, and was now the owner of an orchard from which she gathered the fruit with her own hand, for exercise and amusement. She was from Connecticut, and had accompanied a relative who was far advanced in pulmonary consumption, and who died under her charge. Returning with the body of the deceased, she had it laid in the churchyard at the old home, and then settling up her affairs, for she had considerable property, she came back to her present dwelling place, attracted by the climate and the pleasures of her garden. We found her among her trees, the impersonation of contentment and happiness, and presenting the appearance of a smart, active woman of sixty years. Her age, she told us, was seventy-six years. "Certainly *you* were not an invalid," I remarked. "Indeed I was," she answered; "I had scarcely a day's good health in my life, till I came here, and here I propose to stay till the end of my days."

With the design of observing the physical and mental character of the children in this isolated colony, I visited the district school, or the department containing the older class of pupils. Some forty or fifty were present, most of whom were between nine and thirteen years of age. There was nothing in their appearance to awaken the slightest suspicion of a low standard of health or of configuration. On the contrary, the bloom of health was on every cheek, and the stature and general physique were quite equal to those of the average children of our cities. Their deportment was prepossessing, and they appeared apt and capable with their books and lessons.

The mortuary statistics of San Diego in my possession are too meager for positive deductions. Dr. Hatch informs me that several deaths from disease of the brain, among children, are mentioned in the notes which he collected, and that the children were of consumptive parentage. But the greatest completeness and exactitude in statistics are required, in order to establish sound conclusions.

# SANITARY DEFECTS IN HOUSES AND MANNER OF LIVING.

BY J. P. WIDNEY, M. D., LOS ANGELES.

I wish to call attention in the following article to some of the weak points in our system of house building and living which I have found in the rounds of my daily duties, and to speak of some of the precautions which I have reason to deem worthy of notice.

Very unfortunately, even among the well educated, each man is too apt to think himself entirely competent to plan and build his own house without consulting his family physician as to its sanitary excellencies or defects. It is only when the domicile is finished and the house-warming takes place, that his old friend, the family doctor, is invited upon a tour of inspection; and the inspection is politely limited to the well ordered parlors and the dining-room, where his judgment is taken upon the tone of the new piano, the style of paintings upon the walls, and afterward as to the vintage of the wines that sparkle in the cut glass upon the sideboard.

By and by, however, when an unlooked for onset of diphtheria has stricken the anxious household with dismay, is when comes the days of watching and the weary night vigils by the couch wherein fever has laid its dread hand. Then the physician is besought to enter into the innermost recesses of the house and inspect its most secret corners, that the source of disease may be traced out and the cause removed. Happy that household if it be not already too late; and if the rooms so recently decorated for the incoming be not sadly draped for an outgoing, which is neither that of the christening nor the bridal. Possibly, when we reach that stage of civilization when the community will submit to a law requiring that every building shall be planned and erected under the supervision of a competent sanitary officer, the house of rejoicing will less quickly be turned into a house of mourning, and many of the diseases which seem to riot amid the conveniences and comforts of our so called improved manner of living, will again become strangers at our firesides.

## THE HOUSE.

*First*—Too close building. In large cities the wants and the pressure of a dense population make it possibly a necessity that houses should be closely crowded together; but in the smaller cities and villages there is no good reason why each house should not have around it sufficient yard room, so that fresh air and sunshine shall be the daily portion of its inmates; and flowers and green trees shall not be deemed birthrights only of happy dwellers in far-off Arcadian fields. In that more advanced stage of sanitary civilization of which I have spoken, people may even submit to having these things made the subject of law. Ruskin has dreamed a sweet dream of such a time to come for the overcrowded people of English cities, but, alas, as

yet it is only a dream. We should be a cleaner, healthier, better, and more moral people, if every house could have its own door-yard, and the child that must now perforce go to the streets for a play-ground, could have even the smallest plat of green grass and a few simple flowers to gladden it.

*Second*—The house in narrow lots should be built upon the side of the lot farthest from the sun—that is, if the lot runs east and west the house should be built near the north line, for then the sunlight cannot be shut off from it by some neighbor building his house close against what should be its sunny side; if the lot runs north and south, then the house should be near the west line of the lot in order that the morning sun shall not be shut off by the next building upon the east. A little thought and observation will quickly show how to locate the house upon any lot to secure the greatest amount of sunlight, and prevent buildings upon adjacent lots from shutting it out.

*Third*—In planting trees and vines about the house, only such varieties should be allowed near the building as shed their leaves in the Winter. By doing this, while a grateful shade may be secured in the heat of Summer, in Winter, when dampness and cold are evils to be guarded against, the light and heat of the sun are not shut out.

*Fourth*—Mansard and flat roofs are entirely unsuited to a warm climate, unless, as in many of the old Spanish houses, the roof has a thick layer of non-heat-conducting material. The flat tin, and the mansard roofs make, during the Summer, of the upper rooms a hot, almost uninhabitable furnace, wherein the family swelter through wearisome nights in the vain endeavor to sleep, and tender babes develop attacks of cholera infantum.

*Fifth*—The earth should be slightly banked up against the foundation, and graded with a slope for a number of feet away from the house, so that water cannot make its way under the building. This is especially important in this country where we use no troughs nor pipes under the eaves to carry off the dripping from the roof, and where the grounds are often flooded in irrigating. I have seen houses underneath which, for lack of this precaution, much of the time was standing a pool of stagnant water. This grading away from the foundation is also very essential upon sloping grounds and hillsides, where during heavy rains the rush of water from the hill above is apt to pass directly under the house. It is also much better to have this graded slope covered with a good layer of cement gravel, making it in a degree water-proof.

*Sixth*—Plants and grasses should not be allowed to grow next to the walls, as the constant sprinkling and irrigation needed in this climate to keep them fresh and green must make the foundation and walls damp, and render them unhealthful. Instead of flower beds, the better plan is to carry a broad walk all around the building next to the walls, banked and cemented as described in the preceding section.

#### UNDER THE HOUSE.

*Seventh*—The house should be set well up from the ground, with thorough ventilation under the floors. Two or three small cat holes are not sufficient. There should be openings that will allow a free sweep of wind, so that the air shall be pure and sweet. Neither is it enough to put the floor a few inches from the ground; it should be high enough to allow of a person passing readily under the building

to remove dead animals, inspect leaky water pipes, and examine sewer and drain pipes.

*Eighth*—Cellars. In many localities and soils it is difficult, if not altogether impossible, to have a cellar that for at least a portion of the year will not be flooded with water, which slowly filters in as into a well. In such places it is better to have no cellar, but if one already exists, or if the house builder is especially anxious to have one, a lateral drain, when there is fall enough, will relieve the trouble, and where there is not sufficient fall a remedy can sometimes be found by sinking in the floor of the cellar a well or pipe hole down to the first layer of gravel, where such is to be found within a reasonable depth, with the occasional possibility, however, that should the stratum of gravel have an artesian head of water the flow may be reversed, and the drain become a spring, to the grave perplexity of the householder. It should not be forgotten that the cellar needs thorough ventilation, especially when used as a storage room for vegetables and fruits.

#### WITHIN THE HOUSE.

*Ninth*—In planning the interior arrangement of a house we often find it designed without thought of the direction of frontage, and as a consequence the living rooms are on the cold, shady side of the house, while the warm, sunny side is given up to halls and rooms but seldom occupied. When you ask the owner why it was so arranged, he replies that the house was so planned, and that he did not think of the direction of frontage until after the house was built. In this way I have seen many a fine house practically ruined. Every house should be planned for the lot it is to occupy, and the living rooms and windows arranged to take in the warmth and light of the sun. Often a room upon the shady side of the house may be made pleasant by having folding doors opening from it into an adjoining room which has the sun. Plenty of sunshine is not only a matter of health and comfort, but also of economy in the consumption of fuel, which latter fact may be to many a more potent consideration.

In this connection I might say that the chief merit I can see in the fashionable inside shutter, or blind, as a substitute for the old fashioned outer shutter, is that with it the warmth and light of the sun cannot be entirely excluded from the room, for its flimsy structure is but a feeble barrier compared with the older shutter.

*Tenth*—The house of brick should not have the plastering of the rooms laid directly upon the outer walls, unless these are built hollow, but should have studding let into the walls, with a projection of an inch, and the lath and plaster put upon these, leaving an interspace. In no other way can dampness be effectually guarded against during the driving storms of Winter. I have been in houses where the moisture had penetrated until the paper was molded and rotting upon the walls. A partial remedy for the evil, where houses are already so built, may be found in painting the outer walls.

*Eleventh*—Large rooms are always desirable, and conducive to health, especially in a warm climate. Where they are, through necessity, small, they can often be arranged with folding or sliding doors between, so that in warm weather, and during the heat of the day, several rooms may be thrown into one. In my own house, I planned so that three good-sized rooms and a hall upon the first floor are, at will, thrown into one, and the dividing doors are scarcely ever



closed until the heated term is over. One who has never tried it would be astonished at the difference it makes in the comfort and coolness of the house.

*Twelfth*—A common plan of building in this climate is to have the kitchen detached from the main portion of the house. This, while pleasant in many respects, is often a source of illness, for the passageway is much of the time swept by a cold cross current of air, which to persons heated by the fires of the kitchen is a constant source of colds, often of serious illness. A better way is to have this passageway open only at one side, making it an area inclosed upon three sides, when the odors of the kitchen are in a great measure shut off, and the draft is prevented. Folding doors upon the open side may in Winter convert this area into a close room, if desired.

*Thirteenth*—For houses in a warm climate, and especially for sleeping rooms, the rush matting of Chinese or Japanese manufacture is far preferable to carpets. It is cheaper, cleaner, requires less labor to keep it in order, does not harbor moths, and does not, like carpets, have an entangling mesh of wooly fibers to catch and retain the germs or contagious principle of disease. The over-crowding of sleeping rooms has so often been condemned that one might suppose it would be among the rarest of offenses against health, and yet the experience of every physician shows it to be one of the commonest sources of disease; and this, too, not alone in the dwellings of the poor, where necessity leaves no choice, but the wealthy and well housed are often the offenders. The peculiar, sickening odor of the close, ill ventilated, over-crowded bedroom is familiar to every physician.

*Fourteenth*—Many an illness may be traced back to the bath-room for its origin. The usual style of building locates the bath-room up stairs, over a hall, or in some dark corner where it will not break the symmetrical arrangement of the chambers. It is ordinarily cold and cheerless, with little or no sunlight, and absolutely no method of warming it, while the slopping of water keeps up a perpetual dampness. Many an invalid and feeble person contracts in the chill of the narrow, gloomy bath-room the cold whose ending comes only with the entering into that still narrower chamber under the sod. A better plan for the ordinary dwelling, the home of the family in moderate circumstances, is to build the bath-room off the kitchen, with a door opening between. It is not so stylish, and sometimes not so convenient, but it is better as a matter of health, for the kitchen fire insures a warm bath-room whenever desired. In fine houses, where there are several bath-rooms, and where arrangements are made for warming the room, it is still well to have one built off the kitchen; as the heating of a bath-room involves some extra trouble, and so it will often be neglected. It is well, also, to see that the plug is kept in the vent of the bath-tub when it is not in use, as the infrequency of use of the tub will often, through evaporation, exhaust the water in the trap, and so allow of the free escape of sewer gas back into the house.

*Fifteenth*—Few houses have fire enough. Even in this climate, for nearly six months of the year fire is pleasant in the morning and evening, and during the Winter months is absolutely essential to health, unless for the very robust. Especially is it needed when one of the long settled Winter rains has filled air, house, and clothing with dampness. The public does not realize the harm of sitting in a cold room with bodies half chilled. This half chill is the hand-

maiden of pneumonia and phthisis. Even bedrooms are better to have arrangements for fire in damp weather and in case of illness.

During a long continued rain storm the damp chill of the bed-clothing, in a room without fire, is to a person of feeble vitality even painfully severe, and far from being devoid of risk.

It is easy in a two-story house to plan flues so that at least a pipe hole may be in sleeping rooms above.

#### SEWERAGE.

*Sixteenth*—Some writer has rather wittily said, in discoursing upon the sewerage difficulty, that the human race seems destined to perish in its own filth. Certainly civilization has thus far signally failed in its efforts to satisfactorily dispose of its offal.

The savage, when his camping place becomes offensive with garbage, can move on and leave it. The civilized man is anchored by his houses and his factories. In truth, our civilization, with its complicated details of life and living, is become a thing which we have as yet proved unable to master. The danger is that it may master us. The ever multiplying race of man is treading dangerously near in its own footsteps. Those ancients who taught that in the circle of the ages a cataclysm of fire came at times to the earth to purify it, may have chanced upon the prophecy of a great truth; for it begins to look as though nothing short of the cleansing virtue of a general conflagration could ever make sweet again the earth, polluted with our sewers, our offal, and our garbage. The sewer is a very "old man of the seas" to our municipalities. The embryo city mourns because it has no sewer. The metropolis bemoans itself because it has, and does not know what to do with it. The householder stands guard at the door of his domicile, which the old law declares to be his castle, and scarcely knows whether to look upon the sewer as a friend or an enemy. Buenos Ayres had epidemic typhus because it had no sewer. Our cities are scourged with epidemic diphtheria because they have. It requires no vivid imagination to picture the dark labyrinths of the sewer, as the haunt and lurking place of myriad demons of death, watching their opportunity to find their way by stealth into our houses, and feed upon the lives of our best loved. The demon is there; only, we call it a disease germ, and fortify against it with traps and ventilators, and make war upon it with disinfectants. The men of the Middle Ages would have called it an evil spirit or a ghoul, and have guarded their homes from it with charms, and saints' bones, and have battled valiantly against it with prayers, and terrors of the exorcist.

We may admit that the sewer is a necessity of our crowded city life; but how shall the house be guarded against it? The trap that will at all times keep out its poison gases, when once the pipes have entered within the walls, does not seem to have been yet invented.

Let us examine the weak points of the sewer system as found in our houses. The trap in the branch pipe from the main sewer to the house, where there is such a trap, often fails, through improper construction, to keep back the current of gas, as it is forced by the strength of the current setting backward along the main, or becomes choked with slush, and is alike impervious to the backward flow of the gas or the onward flow of the sewage; and shortly the householder finds the space under his floors flooded with a foul liquid, the most dilute

breath of which is poison. If, however, the pipes under the house are perfect, then the filth comes oozing back from his lower basins and drains. This trouble often arises, also, when instead of connecting with a main sewer the escape pipes lead into a closed vault, which becomes filled up and overflows back into the house.

The next weak point is in the connection between the escape pipes of the house and the drain pipes under the house. I have found in many a house thoroughly trapped escape pipes leading down beneath the floors, and then a hole carelessly cut in the upper plank of a wooden earth pipe through which the descending pipes projected—not even an attempt at making a moderately tight joint. The whole blast of foul air from the sewer or the vault was pouring back under the floors, and making its way up through every crack and crevice, until the entire house was poisoned. And yet the inmates had not the faintest suspicion that they were suffering from the effect of sewer gas, because the traps to their basins were in good order. I have found this apparently inexcusable defect in several houses in which I have had at one time from three to six cases of malignant diphtheria. I now make it a practice in all suspicious cases to go under the house myself when possible and examine the condition and arrangement of the drains. I take nobody's word for it. The only safe plan is not to carry a sewer pipe under the house at all, but to stop it outside of the foundation walls, and to extend the metallic escape pipes outside of the house before tapping it.

Following the pipes back we come to another weak point, not in the theory of the system nor in the construction, but in its practical working. In chambers where the basins are seldom used, it takes only a few days for the water in the trap to evaporate, and then the gas has nothing to keep it from passing back into the rooms. It does no good to see that the plug is in the vent, because the overflow guard of small holes near the upper rim of the basin has no stopper.

Even the pipes themselves are often after a few years eaten through by rust, or corroded by gases, until from innumerable minute points foul air escapes, while the rapid current of water as it passes through the pipe does not betray the weakness by leakage. And this leads to another thought. Instead of being built between floor and ceiling, or in the walls, or between the laths and the outer walls, drainage pipes should be arranged so that they may be open to inspection along their entire course.

A short time since, I had a case of low grade of sewer poison fever in a fashionably built, comparatively new, house. I detected the peculiar odor of sewer gas in the rooms, although the inmates did not notice it, and declared it impossible, as the pipes had been put in with great care. I started upon a tour of inspection. Upon the dining room ceiling, in one corner, was a faint stain. I asked what it was. They did not know. I found it to be damp. Going up stairs somewhat near the spot were a bath-room and water-closet. I tried to find the escape pipes. They were built in the ceiling and the wall. Upon having the floor and the outer boarding of the wall torn open, the pipes, both of the bath-tub and the water-closet, were found eaten through and the foul fluid escaping. The fever was explained.

Again, I repeat, escape pipes should be left exposed to view so that any defect may be at once discovered. It may not be so sightly, but it is safer.

Neither is it well to have long stretches of horizontal pipe. These do not empty themselves so thoroughly, and so are more apt to clog. An inclination, however slight, is better.

It may be asked, what then is to be done if it is so difficult to make and keep secure the drainage pipes from a house? I have answered the question after a fashion in my own house, by having no drainage pipes from the main building. The only drainage I allow is from the kitchen, which is built detached. Everywhere else in the house, in all the chambers and dressing rooms, the old fashioned bowl and pitcher are used, and the slops are carried out. It is some trouble, but then we have no sewer fevers.

If, however, pipes are in use through the living rooms and chambers, care should be taken to thoroughly purify them at regular periods by pouring a pail of boiling water, charged with some efficient disinfectant, into the basins.

And in houses where the bowl and pitcher are used, it is well to give some attention to the slop receptacle which ordinarily stands upon the floor by their side. It, when neglected, is fruitful in foul smells.

In cities where the mouths of the main sewers face toward a strong or prevailing wind, or open into tide water, the driving back of sewer gas is at times strong enough to force traps that are in perfect order. Ventilating towers near the head of the main lines might help to prevent this, and if these towers were still further utilized as smoke stacks for chemical works and smelting establishments, or for factories, a process of disinfection would go on tending to neutralize the poison of the sewer air. Cities might well hold out inducements to factories to thus make use of the ventilating towers.

The water-closet within the walls of a dwelling I cannot look upon as a safe thing. An odor can always be detected near one by a sensitive nostril, and too often the nostril need not be very sensitive to detect it. The average householder will not give it the constant attention needed to make it safe.

And it is well to impress upon people the importance of never neglecting a stench, but to trace it up at once, until the cause is found, and removed. The human nose is a sentry, as well as a source of pleasure; it is intended to smell other things besides roses and Lubin's extracts. Even the smell of illuminating gas in our houses, an odor so common that, through habit, we are almost insensible to it, is warning of an impurity which renders the air less fit for respiration.

There are yet other things to be looked after inside the house. The patent filters that are sold to be screwed upon the faucets of the water-pipes, and the equally efficient flannel rag which the economical housewife ties over the faucet for a home-made filter, ought to be daily removed and thoroughly cleaned; otherwise, a few hours make the clear, sparkling stream of water only an infusion, under high pressure, of the hundreds of water insects, small fish, and sediment, that are rapidly accumulating upon the upper sides of the filter—a sort of *extractum carnis*, scarcely after the formula of Liebig.

#### ABOUT THE HOUSE.

Water tanks, whether the hot water boiler upon the stove, or the cold water tank upon the top of the house, or the large storage tank

used in connection with a windmill, should be frequently scrubbed and disinfected. In the large tanks burning sulphur, after scrubbing, is an efficient method of disinfection. The earthen ollas, also, or water-coolers, should be frequently scalded out, and exposed to the fresh air. It is well, also, to see that the ground near the kitchen door is not kept saturated with slops, thrown out carelessly by the hurried housewife or the servants; neither is a garbage barrel, reeking with decomposition and black with flies, standing close by a door—unemptied from one week's end until the next—either a pleasant or healthful object. A covered bin, or a tight box, put back further in the yard, and frequently emptied, may well take its place. The water-closet should be disinfected at proper intervals—if a vault is used—either with suitable chemicals, or by shoveling in a layer of dry earth.

The relative location of well and water-closet should not be overlooked. I have found wells dug only a short distance from the water-closet, and upon lower ground, where the under-flow of the water seams was from the direction of the vault toward the well. Under such circumstances no reasonable distance of separation can insure safety. Let the well go upon the higher ground, and so that the under-flow will be from it toward the vault. I know of a country school-house where this mistake was made, and the well poisoned, to the serious injury of the children who drank the water.

In conclusion, it is well always to remember that while civilization has freed us from many of the perils and sources of disease incident to the savage state, it has yet brought to us others no less deadly; and I think he will prove the wiser physician who watches how people live, as well as how they sicken and die.

## THE WATER SUPPLY OF THE TOWN OF ALAMEDA.

BY H. GIBBONS, SR., M. D.

There is at present no town or city in California so well supplied with water of unvarying excellence and purity during the entire year, as the Town of Alameda. The encinal of Alameda is a peninsula, having the form of a triangle, five miles long, the base of which is near two miles wide, and faces southward, forming a part of the margin of the Bay of San Leandro. That bay is an arm of the great Bay of San Francisco. Its northern and eastern border forms the arc of a circle extending from near the Town of San Leandro to the line of the Town of Alameda, as already mentioned, a distance of six or seven miles. Along the margin of this bay artesian water is found at a depth of one hundred feet, more or less, the water rising to the surface and flowing over in many localities near the high water level.

Mr. Thompson, a resident of Alameda, observing this source of artesian water, conceived the idea of appropriating it to the supply of the town. The first thing to be done, however, was to determine whether there was a sufficient quantity available. For this purpose he proceeded to sink a number of wells on his property at the southern end of the encinal, where the land was only a few feet above the level of tide water. In sinking the first well, he found, at a depth of forty-five feet, a stratum of gravel eight feet in thickness, and yielding sixteen hundred gallons an hour of good, fresh water. He sank a second well, ninety-five feet deep, coming to a gravel bed six feet thick, which yielded seven thousand gallons an hour. Twenty feet distant from this he sank a third, to the depth of one hundred and twenty feet, when he met with a gravel deposit six feet deep, from which he procured water at the rate of twenty thousand gallons an hour. He sank two other wells, twenty feet apart, and forming a rectangle with the second and third wells—one, one hundred and twenty feet deep, and the other one hundred and fifty. The last yielded sixteen thousand gallons an hour. He next erected two steam pumps, with which he procured forty thousand gallons hourly from the four wells, viz., the first ninety-five feet deep, the second and third one hundred and twenty feet each, and the fourth one hundred and fifty.

Being thus assured that his four wells would furnish a constant supply of a million of gallons a day, he proceeded to the distribution of the water. He sank a reservoir twenty-eight feet deep and wide enough to include the four wells, thus lessening the lifting distance of the pumps. An apparatus was constructed to shut off the flow of the wells into the reservoir when desirable. Pipes were laid through the streets, and the pumps performed the double duty of pumping into the reservoir and pumping from it through the pipes.

To complete the plan, it was necessary to have a reservoir at an elevated point, from which a temporary supply could be obtained in cases of accident or emergency. This point was fixed at the distance of about a mile from the wells, where the surface is twenty-

seven feet above tide water. Here a substantial brick building was erected, and a reservoir constructed one hundred feet above the level of that at the wells, and capable of holding two hundred and twenty-five thousand gallons. It will be observed that the plans as described embrace both the Hollis and the reservoir systems, having the advantages of both. The elevated reservoir was not completed at the time of this writing, but will be in full operation before its publication.

An opportunity of testing the value of this enterprise occurred soon after the laying of a portion of the pipes. A barn containing a large quantity of hay, and adjacent to an extensive lumber yard and a number of valuable dwellings, took fire in the night. Four hydrants were opened on it with hose, and the pumps were set to work. The fire was about a mile from the pumps. The water was driven through the hose with a pressure sufficient to force it to the height of one hundred and fifty feet, and a force considerably greater could have been applied. The fire was confined to the barn, when, beyond a doubt, without the water works much other valuable property would have been destroyed.

Seven miles of pipe had been laid through the streets of Alameda in the beginning of October, and the pipe for seven additional miles was on the ground. A large proportion of the citizens were enjoying the use of the water in their dwellings, and the streets were kept sprinkled every day from the same source. Mr. Thompson informed me that the supply in his wells, so far from diminishing, had increased, the water appearing to have found additional sources of access. Some impression had been made on other artesian wells in the neighborhood, the water being lowered in them several feet.

I am not aware that any analysis has been made of the water, but its sensible qualities are excellent for drinking and for culinary and detergent purposes. The rapidity with which it is conveyed from the wells and reservoirs through the pipes, keeps it always fresh and never deteriorated by stagnation.

There are numerous other localities in California where artesian water can be obtained. In some places the supply consists of surface water, and is limited in quantity. This is the case in San Francisco and the immediate vicinity. The conditions requisite for any considerable or permanent supply are, a stratum of gravel or sand, resting on an impervious bed of clay or rock, and covered by a roof of like material, and extending to some elevated region more or less remote, where the rainfall shall enter and percolate through it. The artesian region may take the form of a river bed or of a lake. At Alameda it appears as a subterranean river bed, half a mile or a mile in width, extending from the southern extremity of the encinal along the shore line towards San Leandro, and probably receiving its supply of water from the foothills and gulches, the line of which is a few miles to the east.

It is worthy of record that the Alameda waterworks are altogether a private enterprise. To Mr. Thompson alone is due the merit of devising and constructing them. All the expenses were drawn from his own funds.

## REPORT

OF THE

## Committee on the Establishment of a State Hospital for Consumptives,

MADE IN PURSUANCE OF A

## CONCURRENT RESOLUTION OF THE LEGISLATURE,

APPROVED APRIL 3D, 1880.

*To his Excellency GEORGE C. PERKINS, Governor, and the honorable Senate and Assembly of the State of California:*

During the session of the Legislature, convened January, eighteen hundred and eighty, the following concurrent resolution was adopted:

*Senate Concurrent Resolution No. 25, relative to appointment of three members of State Board of Health to consider the subject of a hospital for consumptives.*

*Resolved, the Assembly concurring,* That a committee of three members of the State Board of Health, to be designated by the Governor, be and are hereby appointed to consider the subject of a State Hospital for Consumptives, to determine a suitable locality, to investigate the probable cost, to devise a general scheme for the construction and management of such an institution, and to report the results of their investigations to the Legislature at its next session.

In accordance with the above resolution, commissions were issued to the following members of the State Board of Health, viz.: Drs. H. Gibbons, Sr., M. M. Grannis, and F. W. Hatch. Dr. Grannis having deceased in June last, Dr. W. R. Cluness was appointed to fill the vacancy.

For the purpose of explanation, it may not be considered irrelevant to reproduce at this time the petition of the California State Medical Society upon which the above action of the Legislature was based:

*To the honorable the Legislature of the State of California:*

At a regular meeting of the State Medical Society held in the City of San Francisco, April sixteenth, eighteen hundred and seventy-nine, the undersigned were appointed a committee to petition the Legislature to take action looking to the establishment of a "State Hospital for Consumptives."

California, as a State, occupies a somewhat peculiar and exceptional position. It invites immigration on account of its mineral resources, its vast agricultural advantages, the adaptation of its soil and climate to the cultivation, not only of the ordinary productions of the farm, but, in many sections, of tropical and semi-tropical fruits, while, at the same time, it has held out inducements to settlement based upon sanitary advantages of which few of the other States can boast. Hence, it has become the resort not only of the young and vigorous, and those seeking to engage in active industrial or business pursuits, but by the weak and dependent, by invalids seeking to avail themselves of the benefits, real or imaginary, which the climate affords. A very large proportion of this latter class are sufferers from chronic pulmonary complaints, victims of consumption, whose coming has been encouraged and hastened by the laudatory and oftentimes injudicious accounts given of the special advantages of the climate by interested landowners or enthusiastic travelers. That some derive benefit from the change, and are



apparently restored to health, is true; but the misfortune is that very many whose strength is already far spent and who are sufferers from the advanced and generally incurable stages of disease, come only to reap disappointment and to die among strangers. It is, to a large extent, from this class, unable to work, without means or friends, that our hospitals are filled. How many such find their way to California, the public, it is believed, have but a faint conception.

In eleven hospitals reporting to the State Board of Health for eighteen hundred and seventy-eight, there were, in a total of 1,884 patients admitted, 127 cases of consumption, or nearly 7 per cent. In San Francisco alone—eighteen hundred and seventy-eight and eighteen hundred and seventy-nine—out of a total of admissions amounting to 3,174 patients, 245 were due to consumption, or nearly 8 per cent.; and John S. Hittell, Esq., in remarks on this subject in its relation to San Francisco, has shown that, as a rule, "about 300 consumptives, 200 of them from other counties, are admitted annually to the county hospital, and the expense to San Francisco of these 200 phthisical patients from other parts of the State is perhaps \$13,000 a year, enough to provide for 600 patients of other classes, since the consumptives live longer and cost more on an average than the others."

The history of many of these invalids, antecedent to admission to the hospital, we are commonly unable to trace, yet sufficient is known to warrant their classification with those to whom the remarks above made apply.

The question is not so much as to the propriety of imposing upon a few counties the expense of caring for and supporting—often for many months—this increasing class of invalids, or of taxing a few for what, in the opinion of many citizens, should of right be made a State charge; the argument upon which we rely is of a higher and more honorable character; it is above all considerations of dollars and cents; it looks only to the welfare of these unfortunate invalids. It is strictly a question of philanthropy—essentially humanitarian in its nature. It is to benefit the sick and suffering; to save life, when this is possible; to place the invalid under such conditions of locality, climate, regimen, and general management, as shall be most favorable to improvement of health, and possibly to ultimate recovery. Such conditions are seldom found in our county hospitals. Observation has shown that certain sections of the State are more favorable to the consumptive than others; that certain conditions of climate, as soil, elevation, temperature, and humidity—that the adoption of certain habits and modes of living—are, it might almost be said, essential to success in the treatment of consumption. Many of our county hospitals are not properly located to supply these advantages; some of the conditions just mentioned are wanting; some of them are unsuitably constructed; and not many have accommodations for the class of invalids under consideration—without doing injustice to others, the proper subjects of their care. It is only in a State institution, eligibly located, suitably equipped, specially constructed and adapted to the hygienic treatment of consumption, that the full benefit of our climate may be demonstrated. It is not impossible that such a demonstration, besides fulfilling all the obligations which the spirit of philanthropy imposes, may, by its favorable result, be the means of attracting population, and thus amply repaying the cost expended. Under the existing circumstances, the State is losing in sanitary reputation. Should the measure recommended be adopted, it cannot fail to gain.

Doubtless, a considerable proportion of those who now find their way into our county hospitals and die there, would, if a proper place were provided for treatment, recover their health and become useful and profitable citizens. Many, not entirely destitute, would avail themselves of the advantages afforded by such an institution; many others, not able to perform hard labor, could be profitably employed in those out-door exercises which would form an essential part of its hygienic management; and there is no reasonable doubt that it would eventually be almost, if not quite, self-sustaining.

Being fully persuaded of the expediency of the proposition embodied in this petition, and of the benefits which would result therefrom, not only to the unfortunate invalid, but to the reputation of the State, the undersigned respectfully submit the subject to the consideration of the Legislature.

F. W. HATCH,  
W. AYER,  
W. P. GIBBONS,  
Committee.

SACRAMENTO, February, 1880.

The range of duty imposed by the concurrent resolution is extensive and responsible, and by no means easy of fulfillment. The field of observation is wide; there are so many localities in which one or more of what are considered essential requisites to become the seat of an institution such as it is proposed to establish, so many which have acquired a certain amount of reputation as sanitary resorts, and in behalf of which, local interests and prejudices are evoked, that it is no easy matter for your committee entirely to exclude all extraneous influences, or, possibly, even their own preconceived ideas. In almost all sections of the coast mountain regions, and, possibly, of

the Sierras, from the extreme north, to San Diego, in the foothills and elevated valleys of Shasta, of Tehama, of Lake, of Sonoma, of San Luis Obispo, and San Bernardino, localities may be found equaling in climatic features almost any in the United States, or perhaps in the world.

Then, again, different forms of phthisis—different stages of the same form—may require different climatic influences, thus increasing the embarrassment of the situation. What we may hope to do, is to indicate that climate which, under ordinary circumstances, and in by far the greater number of cases the experience of the profession has shown to be most suitable.

The elements generally demanded for the location of a State Hospital for Consumptives are, in the judgment of your committee:

First, a certain equability of temperature; second, the absence of excessive humidity; third, elevation; fourth, exemption from fogs and strong winds, especially cold winds; fifth, an abundant supply of pure water. With regard to the first of these, there will probably be no dissenting opinion. It is admitted by all who have considered the climatic influences proper for the consumptive, that great variability of temperature, sudden vicissitudes, an extreme daily range, and, less prominently, a wide yearly range, are, in proportion to their prominence, hazardous to the susceptible constitution of the victim of pulmonary disease.

With regard to the second proposition, there is some diversity of opinion, even among the most intelligent observers; or, rather, there are different views entertained as to the degree or percentage of humidity most grateful to the patient, and favorable to recovery. The position assumed by the committee is, it is believed, sustained by the weight of authority. Statistics published by C. H. Williams, and others, seem to set this question almost at rest; and it is a matter of common observation that for most cases of phthisis a dry atmosphere is much less depressing than a moist one. A certain amount of relative humidity is, indeed, necessary; the argument is against its excess. The percentage of moisture generally thought to be most agreeable in a state of health, is about seventy-five; in the cases now under consideration, it is much less. Dry air is stimulating; moist air is sedative, particularly when warm; and this is true not only of its constitutional influence, but of its local effect when inhaled. Most forms of phthisis seem to demand the former; catarrhal phthisis—a not uncommon form—is thought to do better in the latter. Dry and stimulating air is best suited for the first or early stage of the disease—generally, also, for the second; a moist and sedative air to the third stage; yet the commonly injurious effects of humidity appear to be contracted in some way by the presence of saline vapors in the atmosphere, as on sea voyages, or near the coast in certain localities. This latter fact is exemplified by the salutary influence of the climate of San Diego and similar localities in the southern part of the State. As between dry and warm, and dry and cold climates, the latter are preferable when there is sufficient force remaining in the individual to maintain a circulation and bodily temperature.

Intimately associated with a low percentage of atmospheric moisture is the *elevation*; and, doubtless, this latter owes much of its beneficial influence to its co-existence with other important auxiliary elements, as low atmospheric pressure, equability of temperature, and a clear sky,

or sunlight. Without such associate conditions as admit of daily exercise, within proper limits, and outdoor life, the element of altitude would be of inconsiderable utility. Without entering into a review of this subject as shown by statistics, it may without trespassing beyond the legitimate purpose of this report, be in place to state that Lombard, quoted by Dr. B. F. Lincoln, of Boston, found that the lower altitudes of Switzerland (from 1,250 to 1,650 feet) had a mortality by consumption amounting to 10.2 per cent. of the total mortality; the regions of medium elevation (1,725 to 2,700 feet) had 9.4 per cent.; the high regions (2,700 to 4,000 feet) had 5.1 per cent.; while above 5,000, he states, the disease disappears entirely. In the Peruvian Andes, it is said that consumption is not known above 5,000 feet, while on the coast it extensively prevails. Upon the Mexican plateau it seems to disappear at an altitude of 7,000 feet.

It should be borne in mind, however, that the benefits to be derived from both these conditions of humidity and altitude are not to be assigned exclusively to them. There must be taken into account the other elements alluded to—the equability of temperature, freedom from cold winds, the resources of the place for diversion of mind, for agreeable exercise, and, above all, for outdoor life.

In addition to what has already been said, other requisites indispensable for the usefulness of a State asylum for the consumptive are *accessibility*, and a dry temperature such as not to render outdoor labor oppressive. The proper plan for such an asylum contemplates suitable work for the patients.

The pernicious influence of frequent fogs and strong cold winds requires no demonstration. It is mainly due to the prevalence of these two features at certain seasons that the climate of San Francisco is regarded as being so much more unsuitable for consumptives than other points southward on the coast. Their effect is seriously felt by those visiting the metropolis from the interior while in good health, and they are to be considered the slow causes of the development of certain organic changes in those constantly subjected to their influence. How much more likely must they be to become the exciting agents of disease in the sensitive organization of the sick. Hence the impropriety, not to say cruelty, of sending patients with consumption from other parts of the State to San Francisco.

It is needless to say that the considerations thus briefly sketched have been kept in view by your committee in their investigation of the subject committed to their charge.

The duties imposed by the joint resolution of the Legislature, under which they are now acting, embrace several distinct propositions—“to determine a suitable locality; to investigate the probable cost; and to devise a general scheme for the construction and management of such an institution.”

In seeking to discharge the first of these duties, the committee have visited several portions of the State, having regard especially to their supposed advantages, and in respect of some, their established reputations as sanitary resorts. The points especially examined were: Atlas Peak, Veeder Mountain, Howell Mountain, Pope Valley, near Aetna Springs, and Troutdale—all in Napa County; Lakeport, in Lake County; The Sierra Madre Range, in Los Angeles County; Ojai Valley, in Ventura County; San Diego and its vicinity. Santa Barbara had been previously visited by the members of the committee.

By the unexpected death of Dr. M. M. Grannis, a vacancy occurred

upon the committee early in our investigations. Dr. W. R. Cluness was appointed to fill his place.

A brief reference to the localities visited seems appropriate, and will not be without interest as a contribution to the climatology of the State. Commencing with Napa County and its many inviting retreats for the invalid, we mention—

#### ATLAS PEAK AND VICINITY.

This region, situated on the ridge of the Coast Range Mountains, east of Napa Valley, has, of late years, attracted considerable attention on account of its equability of temperature, its freedom from fogs, or from harsh winds, the dryness of the atmosphere, and its supposed advantages as a residence for the consumptive. Its elevation is about 1,500 feet; its mean Winter temperature is  $50^{\circ}$ , its Summer temperature  $74^{\circ}$ ; and its mean annual relative humidity only 45 per cent., or 51 in Winter and 39 in Summer. It is within twelve miles of the City of Napa, easily accessible from the entire central portion of the State and from the coast, and the soil is well suited to the cultivation of grain, fruit, and vegetables. The climate of this ridge is remarkable for its healthfulness; no malarial diseases are known there; there is an abundance of pure water; the atmosphere, though sometimes warm for a short period at noon, is never oppressive; the evenings are agreeably cool and invigorating; the Winters are mild; and excellent facilities are afforded for camp-life and out door exercise at all seasons of the year.

Some meteorological observations are given below; others may be found in the chart:

#### RESULTS OF METEOROLOGICAL OBSERVATIONS AT ATLAS PEAK.

(Reported by A. P. EVANS.)

*March, 1876.*—Highest temperature,  $72^{\circ}$ ; lowest,  $32^{\circ}$ . Average change every twenty-four hours,  $9.7^{\circ}$ . Average difference between wet and dry bulb,  $6.4^{\circ}$ . Number of clear days, 22; rainy days, 5.33; cloudy days, 3.66.

*April, 1876.*—Highest temperature,  $71^{\circ}$ ; lowest,  $38^{\circ}$ . Average change every twenty-four hours,  $11.13^{\circ}$ . Average difference between wet and dry bulb,  $7.66^{\circ}$ . Number of clear days, 20; hazy, 4.66; cloudy, 3.66; fog and rain, 1.

*May, 1876.*—Highest temperature,  $78^{\circ}$ ; lowest,  $40^{\circ}$ . Average change every twenty-four hours,  $12.48^{\circ}$ . Average difference between wet and dry bulb,  $11.94^{\circ}$ . Number of cloudy days, 28; hazy, 2; rainy, 1.

*June, 1876.*—Highest temperature,  $94^{\circ}$ ; lowest,  $45^{\circ}$ . Average change every twenty-four hours,  $7.63^{\circ}$ . Average difference between wet and dry bulb,  $12.03^{\circ}$ . Number of clear days, 28.33; hazy, 1.66.

*July, 1876.*—Highest temperature,  $90^{\circ}$ ; lowest,  $52^{\circ}$ . Average change every twenty-four hours,  $10.42^{\circ}$ . Average difference between wet and dry bulb,  $16.09^{\circ}$ . Number of clear days, 30; hazy, .66; rainy, .34.

*August, 1876.*—Highest temperature,  $85^{\circ}$ ; lowest,  $50^{\circ}$ . Average change every twenty-four hours,  $10.42^{\circ}$ . Average difference between wet and dry bulb,  $17.16^{\circ}$ . Number of clear days, 30; cloudy day, 1.

*September, 1876.*—Highest temperature,  $86^{\circ}$ ; lowest,  $55^{\circ}$ . Average change every twenty-four hours,  $10.67^{\circ}$ . Average difference between wet and dry bulb,  $18.27^{\circ}$ . Number of clear days, 30; cloudy, 1.

*October, 1876.*—Highest temperature,  $82^{\circ}$ ; lowest,  $43^{\circ}$ . Average change every twenty-four hours,  $8.27^{\circ}$ . Average difference between wet and dry bulb,  $9.33^{\circ}$ . Number of clear days, 23.67; cloudy, 2.66; hazy, 2.34; rain, 2.33.

*November, 1876.*—Highest temperature,  $71^{\circ}$ ; lowest,  $41^{\circ}$ . Average change every twenty-four hours,  $10.4^{\circ}$ . Average difference between wet and dry bulb,  $10.43^{\circ}$ . Number of clear days, 27.67; cloudy, 1.33; hazy, .67; rainy, .33.

*December, 1876.*—Highest temperature,  $62^{\circ}$ ; lowest,  $38^{\circ}$ . Average change every twenty-four hours,  $14.67^{\circ}$ . Average difference between wet and dry bulb,  $9.23^{\circ}$ . Number of clear days, 27.34; hazy, 1.66.

The situation on the ridge is well adapted for such a hospital as would be required for consumptives. It is a nearly level plain, for a great part of the claim; there are no cañons or ravines; the soil is a rich, dark, sandy loam, bearing abundantly of fruits and vegetables. Green corn, we were told, was distributed to friends in the valley on Thanksgiving Day, eighteen hundred and seventy-nine. There are 120 acres, nearly all suitable for cultivation. The place may be purchased for \$6,000.

The day—October seventh, eighteen hundred and eighty—on which Atlas Peak was visited by the committee was thought to be an unfavorable one. A heavy fog rested over the valley and upon the mountain sides; yet upon reaching the Peak, we were informed that no fog had been observed there.

The property is owned by Mr. A. P. Evans.

#### VEEDER MOUNTAIN.

The Veeder Mountain is located on the west side of Napa Valley, twelve miles from Napa City, at an elevation of 2,300 feet. The little plain on the east side of the mountain, to which the attention of the committee was particularly called, has an altitude of 1,800 feet. It faces the south and east, and affords a beautiful landscape. The land is said to be unsuitable for the cultivation of grain, but vegetables and fruit trees grow luxuriantly. Tomato vines live during the Winter. A fine stream of cold water runs through the place, and springs near by afford an inexhaustible supply.

The location is a good one for a State hospital for consumptives, and affords excellent facilities for camping out amid clusters of redwood trees. There are said to be an abundance of trout in the stream, and of game on the hills. Three hundred and twenty acres of land are owned by Mr. Wing, which are offered for \$7,000.

The temperature at midday in Summer, as in almost all other mountain localities, rises sometimes as high as 98°, but only for a few days each season, the early morning minimum temperature being 48° or 50°.

A communication from Mr. Wing gives the following specific information: "The lower part, near Dry Creek, is heavily wooded and timbered. The quantity of wood on the place is estimated at from 10,000 to 12,000 cords, besides a large quantity of redwood timber. There are six fish ponds—two large, and four small. \* \* \* There are very few places in the mountains so well supplied with pure spring water; and the fountains of it are so elevated that it can be carried to every part of the place in pipes—enough for fish ponds, domestic use, bathing, and irrigation. \* \* \* The large redwoods in the deep cañons afford fine shade and romantic spots for invalids in warm weather. There are some forty or fifty redwood groves, such as the camping party were using when you were here."

The following temperature table for July, August, and a portion of September, of the present year (eighteen hundred and eighty), will give a fair idea of the Summer climate of this place, so far as concerns this one element. It has been furnished by Mr. Wing:

JULY.				AUGUST.				SEPTEMBER.			
Date.	7 A. M.	12 M.	8 P. M.	Date.	7 A. M.	12 M.	8 P. M.	Date.	7 A. M.	12 M.	8 P. M.
1	-----	-----	-----	1	50	80	50	1	64	84	68
2	-----	-----	-----	2	52	82	60	2	68	88	74
3	-----	-----	-----	3	54	82	62	3	66	90	68
4	-----	-----	-----	4	-----	-----	60	4	-----	-----	-----
5	47	70	54	5	56	76	64	5	-----	-----	-----
6	44	77	70	6	56	82	-----	6	-----	-----	-----
7	53	80	60	7	60	-----	66	7	50	84	62
8	52	78	62	8	66	90	66	8	60	86	64
9	55	76	68	9	66	84	64	9	56	84	66
10	-----	-----	62	10	56	80	60	10	64	90	64
11	54	80	62	11	54	78	58	11	-----	-----	-----
12	66	84	70	12	56	78	54	12	54	82	60
13	70	86	68	13	52	82	56	13	52	72	-----
14	72	90	70	14	52	76	58	-----	-----	-----	-----
15	58	80	68	15	62	86	68	-----	-----	-----	-----
16	58	82	64	16	54	80	60	-----	-----	-----	-----
17	52	86	60	17	48	76	58	-----	-----	-----	-----
18	54	80	60	18	46	82	64	-----	-----	-----	-----
19	52	78	58	19	56	88	68	-----	-----	-----	-----
20	48	80	60	20	60	84	66	-----	-----	-----	-----
21	50	80	62	21	-----	-----	-----	-----	-----	-----	-----
22	56	88	64	22	-----	72	64	-----	-----	-----	-----
23	-----	-----	-----	23	50	72	58	-----	-----	-----	-----
24	62	80	58	24	58	74	60	-----	-----	-----	-----
25	52	80	56	25	56	82	58	-----	-----	-----	-----
26	48	76	60	26	56	84	56	-----	-----	-----	-----
27	52	74	58	27	54	86	58	-----	-----	-----	-----
28	48	76	56	28	-----	-----	-----	-----	-----	-----	-----
29	-----	-----	-----	29	50	74	56	-----	-----	-----	-----
30	50	74	56	30	48	76	60	-----	-----	-----	-----
31	50	76	52	31	54	82	60	-----	-----	-----	-----
---	52.6	79.6	61.5	---	54.5	77.4	60.2	---	59.3	84.6	65.7

The thermometer is exposed on the west side of the house, seemingly somewhat to reflected heat at or about midday.

A mile or two before reaching Mr. Wing's, is a tract of 164 acres of equally good land, better adapted to the cultivation of grain, and offering similar advantages for sanitary purposes, which can be purchased, it is said, for \$4,500. It is on higher ground than the place of Mr. Wing, the elevation being about 300 feet greater—or not far from 2,100 feet. It has seven or eight springs of pure water, affording an inexhaustible supply. There are now about eighty acres of good tillable land, and thirty acres more that can be easily prepared for the cultivation of a vineyard. The wood on the place is estimated at from 3,000 to 4,000 cords. The whole property is inclosed with a good fence.

#### HOWELL MOUNTAIN.

Leaving St. Helena, the summit of Howell Mountain is reached after a ride of eight miles. According to the information received, its elevation is probably about 1,600 to 1,700 feet. As was found to be the case wherever the committee visited, the climate at the time seemed to be exceptional. The ride from St. Helena was for the most part through a cold fog, and on arriving at the summit we were informed that some fog had hung over the locality for an hour or so for several mornings. At 10 o'clock A. M. it was clear and pleasant.

The atmosphere is evidently dry and invigorating, and the temperature agreeable, except at noon, when, as in all other interior localities in California, it may be warm for two or three hours. The temperature at 10 A. M., was about  $70^{\circ}$  (July), and we were told that it occasionally rose at the hour of maximum to  $80^{\circ}$  or  $90^{\circ}$ , rarely to  $95^{\circ}$  or  $96^{\circ}$ . The nights are cool yet free from the humidity observed in the valley. It is an excellent place for the camp for outdoor life; and but for the liability to fogs would be an excellent locality for a hospital. Probably these do not occur sufficiently often to constitute a serious objection. The locality appears to be a continuation of the range of hills which form the seat of what is known as the "Thermal Belt," and which constitutes a marked feature of Atlas Peak and the other points on the eastern side of Napa Valley, though, from its greater altitude, it is colder in the Winter season. The climate corresponds, however, in the main, with the possible exception of the more frequent occurrence of morning fogs. It was stated that fogs seldom reach the summit of Howell Mountain, though observable on its western slope, at lower elevations. This is quite probable, and the occurrence of fogs at the time of our visit in July, eighteen hundred and eighty, was like the same climatic feature in other localities visited by the committee, quite exceptional.

Land suitable for the purpose of a hospital, according to information received, can be obtained here at a cost of from fifteen to twenty dollars per acre, including water privileges for a hospital, its situation and surroundings being adapted for outdoor life during the greater part of the year, and much of it capable of cultivation.

It is quite probable that on the eastern slope of this mountain, even near the summit, fogs would not be felt. The ridge is a part of that thermal belt of which much has been said by writers on our climate, and which, on account of its remarkable uniformity of temperature, and its dry, pure atmosphere, has been regarded to be peculiarly adapted for a residence for the invalid. It has been observed that while on some parts of this ridge the fogs or mists which sweep along the valley on the west and the western slope of the hills, rising almost, yet rarely, quite to the summit, almost never reach across the latter to the eastern slope.

Blake's "Sanitarium," not far off, on St. Helena Mountain, and Atlas Peak, further south, are the only two points on this ridge at which regular meteorological observations are taken, and from these we are able to form a general idea, modified by local peculiarities, of the climate of Howell Mountain. There are, however, some important differences. At Blake's there are no fogs, and the place is regarded by Dr. Blake as being the nearest locality to San Francisco where there are no fogs in Summer. The range of temperature at Blake's—the mean of the maxima and minima—in January, eighteen hundred and seventy-eight, was  $49.2^{\circ}$  (maximum), and  $39.2^{\circ}$  (minimum); in July,  $81.5^{\circ}$  and  $59^{\circ}$ . The highest temperature of January was  $59^{\circ}$ ; the lowest,  $29^{\circ}$ . The highest in July was  $92^{\circ}$ , and the lowest,  $45^{\circ}$ . Probably, and such is the opinion of Dr. Blake, the temperature range is not materially different on Howell Mountain. Dr. Blake writes, as regards Howell Mountain: "I expect the range of temperature is about the same as here, but it must be in the region of occasional Summer fogs, as the redwood grows on the mountain, and I believe it only flourishes where there are occasional fogs during the Summer."

## TROUTDALE, NAPA COUNTY.

The committee visited this place about the last of July. It is upon the north side of Mount St. Helena, about eight miles from Calistoga, the altitude at the house, which is built upon a flat, being 1,575 feet. Although no regular meteorological observations have been taken here, the atmosphere is known to be dry, and its temperature possessing the general characters observed a little higher up, on the same side of the mountain, at Blake's Sanitarium. The latter, however, is 2,100 feet in altitude, and has its temperature somewhat modified by that circumstance, and by topographical differences. The air is pure, fresh, and invigorating, the climate such as to admit of an outdoor life for the greater part of the year. There is an abundance of water; a fine trout stream runs through the place, near the house, and game—deer and quail—abounds in the hills. The place in the vicinity of the house is well protected from strong winds, and fogs are said never to prevail. There are from fifty to sixty acres susceptible of cultivation, the remainder being wooded land.

The climate here may be somewhat colder than at Blake's, and the Summer range probably greater.

This place may be purchased, including improvements, four horses, carriage, etc., for \$2,500.

## LAKEPORT, LAKE COUNTY.

Lakeport lies on the west side of Clear Lake, about forty-eight miles from the terminus of the Napa Valley Railroad at Calistoga. The location is in one of the most beautiful valleys in the State, possessing a reputation as a sanitary resort unsurpassed by any other. It is, and has been for years, the favorite camping-ground for invalids from the northern and middle sections of the State. It has been from the ranks of such invalids that the country about the lake has been in great part settled, and the present physical character of the adult population, as well as the healthful vigor of the children, attests the invigorating influence of the climate. No malarial fevers originate here; fogs are rarely observed; and it is protected, on the west, by a ridge of the coast range mountains from the cold, moist winds which are felt in the coast valleys.

No regular meteorological record has been kept, though the atmosphere is essentially dry. Venison, of which there is an abundance in the vicinity, suspended in the open air, dries, but does not decay. The extreme Summer temperature does not vary greatly from that of the vicinity of Sacramento, though the duration of high temperature daily is much less. The Winters are colder, yet the thermometer is said to fall but seldom below 15° below the freezing point; orange trees, we were informed, survived the Winter of eighteen hundred and seventy-nine-eighty, which was one of the coldest experienced for some years.

The rainfall during the season of eighteen hundred and seventy-eight-nine was about 47 inches.

The elevation appears to be not far from 1,200 feet.

Extending their investigations to the southern part of the State, the committee visited Ojai Valley, in Ventura County, the Sierra Madre Range, in Los Angeles County, and San Diego, in San Diego County. Santa Barbara had been previously visited by two mem-



bers of the committee. These are more particularly described and commented upon below.

#### SANTA BARBARA.

Santa Barbara lies upon the coast, nearly 300 miles southeasterly from San Francisco, sheltered on the northwest by Point Conception, and southerly by the Islands of San Miguel, Santa Rosa, and Santa Cruz. It has acquired, at home and abroad, a reputation for the possession of a climate favorable for the consumptive, and is resorted to by many in the various stages of pulmonary disease. It is to be recommended for its equability of temperature for the greater part of the year, and its freedom, as compared with more northern points on the coast, from severe winds. In the early stage of consumption it seems to be well adapted as a Winter residence.

The table of temperature and humidity, given below, exhibits these two important climatic elements in a favorable light. During the Winter season, especially, the temperature is equable, possessing a mean for November, December, and January of  $59.6^{\circ}$ ,  $55.2^{\circ}$ , and  $55.03^{\circ}$ , respectively, while the mean relative humidity for the same period is 65.5, 64, and 70 per cent. The rainfall at Santa Barbara has an average of 14.71 inches (mean for eight years).

In the Summer the temperature is higher than in more northern localities on the coast; but there is, during this season, a certain amount of wind not well tolerated by the sensitive organs of the sick. Fogs are said to prevail here at this season, though to an extent greatly less than further north.

The following table of temperature and humidity at Santa Barbara was prepared by Dr. L. M. Dimmick:

## MEAN TEMPERATURE AND HUMIDITY AT SANTA BABBARA.

(Reported by DR. L. M. DIMMICK.)

DAY OF MONTH.	1876.										1877.	
	APRIL.	MAY.	JUNE.	JULY.	AUGUST.	SEPT.	OCTOBER.	NOV.	DEC.	JAN.		
	Mean Daily Temperature.	Mean Daily Humidity.	Mean Daily Temperature.	Mean Daily Humidity.	Mean Daily Temperature.	Mean Daily Humidity.	Mean Daily Temperature.	Mean Daily Humidity.	Mean Daily Temperature.	Mean Daily Humidity.	Mean Daily Temperature.	Mean Daily Humidity.
	Mean Daily Temperature.	Mean Daily Humidity.	Mean Daily Temperature.	Mean Daily Humidity.	Mean Daily Temperature.	Mean Daily Humidity.	Mean Daily Temperature.	Mean Daily Humidity.	Mean Daily Temperature.	Mean Daily Humidity.	Mean Daily Temperature.	Mean Daily Humidity.
1	56	62	66	66	59	66	68	73	72	80	68	71
2	57	81	67	57	62	70	66	75	72	78	68	69
3	33	74	64	51	61	75	66	81	70	71	61	71
4	59	77	59	62	66	74	66	78	66	76	67	70
5	51	76	62	73	63	80	67	75	66	77	66	70
6	57	77	65	63	62	68	68	77	67	76	64	70
7	54	72	63	73	65	89	69	77	68	71	64	72
8	51	58	64	67	65	68	65	65	71	71	65	74
9	58	55	59	76	65	64	70	66	70	73	69	72
10	54	49	61	73	65	68	72	62	69	73	67	72
11	54	36	58	78	68	63	72	71	70	73	68	74
12	62	51	60	71	62	72	67	80	68	73	67	77
13	59	55	60	57	68	75	68	74	66	72	69	76
14	60	55	60	66	66	74	68	74	66	71	69	78
15	65	57	62	62	65	78	69	69	69	71	66	73
16	71	58	60	60	69	72	68	69	69	69	65	79
17	62	72	62	44	69	74	66	76	68	71	66	75
18	59	71	64	57	67	75	65	68	65	73	66	78
19	59	69	63	59	65	77	68	77	67	70	64	82
20	59	69	64	56	68	70	68	72	66	64	68	85
21	58	76	63	51	68	69	72	79	65	66	63	85
22	59	77	65	62	69	68	73	78	66	73	63	77
23	57	66	64	66	67	76	72	85	67	75	63	82
24	61	67	68	67	66	79	73	74	65	78	79	64
25	62	71	67	60	68	79	73	72	65	79	85	87
26	66	70	70	57	68	80	70	73	64	75	71	83
27	74	53	66	61	68	75	69	76	64	75	68	81
28	77	53	62	73	67	77	69	76	63	74	67	81
29	72	58	64	68	68	77	71	74	63	67	69	80
30	62	64	67	54	69	75	71	79	66	68	73	75
31	--	--	63	63	--	--	70	77	66	68	--	60

## OJAI VALLEY.

A ride of fifteen miles from San Buenaventura, over a shaded and romantic road, brings the traveler to Ojai Valley, a beautiful range of country, lying at an elevation of about 1,200 feet, surrounded in the greater portion of its circumference by high hills which protect it from the ocean winds, and, for a portion of the year, from fogs. The latter are said not to prevail to a very injurious degree, and the Spring and Fall months are described as being exempt.

The climate is evidently dry, though no observations have been taken there, and equable. It is also invigorating upon the system. The Summer temperature rises almost too high, at times, even to

98° or 100°, but this is not usual, nor is the effect oppressive or debilitating as in lower altitudes and more humid climates. The valley is shaded by large and beautiful oaks, which there seems to be conservative spirit and good sense enough among the inhabitants, to allow to grow unmolested. Water is said to be abundant.

Careful inquiries seem to establish the following facts regarding this place :

The elevation of the Lower Valley at Nordhoff is about 1,000 feet above the sea level ; that of the Upper Ojai Valley, about 1,200 feet.

The range of temperature in Summer is from 70° to 96°. Last Winter, eighteen hundred and seventy-nine and eighteen hundred and eighty, the lowest temperature for a few nights was 26°.

The humidity of the valley is low, although there have been no observations made to demonstrate the fact.

Fogs rise over the valley occasionally, mostly in May and June ; they are dissipated at an early hour of the morning. An abundant supply of water can be had by means of artesian or flowing wells.

Land can be obtained at from twenty to fifty dollars per acre, according to cultivation.

#### SIERRA MADRE VILLA, LOS ANGELES COUNTY.

This attractive place is located in the foothills of the Sierra Madre Mountains, northeasterly from Los Angeles, and thirteen miles distant ; the elevation is about 800 feet. It is protected, to a great extent, from the winds which prevail in the valley, and is sufficiently removed from the ocean not to be affected injuriously by the sea breezes, or seriously by fogs. The latter occasionally hang over the vicinity, but only for a brief period, and, according to the testimony received, they are quite exceptional. The temperature is given in the following table, kindly furnished by Mr. J. C. Davis, who has resided on the place for many years. It is not improbable that the thermometer at its maximum elevation was frequently subjected to influences which raised the mercury above the true temperature. Under proper exposure the mercury seldom rises, even in the valleys of California, as high as 110°. Reports to the contrary are evidently based upon faulty exposures :

## SUMMARY OF THERMOMETRIC OBSERVATIONS,

*At Summit Hill, Los Angeles County, for six years ending December 31st, 1875.*

MONTHS.	1870.			1871.			1872.			1873.			1874.			1875.		
	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.
January-----	38	68	53	38	79	58.5	36	74	55	41	84	62.5	36	74	55	38	72	55
February-----	42	84	63	35	75	55	42	79	60.5	35	75	55	38	72	55	46	76	60.5
March-----	40	85	62.5	42	81	61.5	41	83	62	42	82	62	38	74	56	38	80	59
April-----	38	89	63.5	38	87	62.5	40	92	66	35	91	63	44	82	63	34	88	61
May-----	43	96	64.5	48	95	71.5	43	97	70	48	89	68.5	46	88	67	49	95	72
June-----	47	90	68.5	48	92	70	46	110	73	53	94	73.5	51	98	-----	50	95	74.5
July-----	56	98	77	56	100	78	50	94	73	52	104	78	60	96	78	53	92	72.5
August-----	52	95	73.5	56	105	80	53	103	78	56	98	77	56	100	78	58	103	80
September-----	53	95	79	54	102	78	52	104	78	50	102	76	53	98	75.5	56	92	74
October-----	44	100	72	50	102	76	48	99	73.5	48	96	73	50	91	70.5	56	98	77
November-----	44	86	65	44	86	65	46	86	66	46	93	69.5	41	83	62	49	80	64.5
December-----	35	79	57	42	80	61	41	80	60.5	40	80	60	41	80	60.5	42	80	61
Means for six years-----	44.3	88	66.5	46	90	68.1	44.8	91.7	66.4	45.5	82.3	68.1	49.5	86.3	65.9	47.4	87.5	67.5

Comparing the figures given in the above table with those obtained from other well known sanitary resorts, it is found that while the mean of the monthly temperatures for six years at Sierra Madre, in January, is  $56^{\circ} 5'$ , it is reported by Mr. Hittell to be  $50^{\circ}$  at Atlas Peak;  $45^{\circ}$  at Blake's;  $52^{\circ}$  at Los Angeles;  $53^{\circ}$  at Santa Barbara; and  $51^{\circ}$  at San Diego.

The same authority, and method of comparison for July, gives us:  $76^{\circ}$  for Sierra Madre;  $74^{\circ}$  for Atlas Peak;  $73^{\circ}$  for Blake's;  $75^{\circ}$  for Los Angeles;  $68^{\circ}$  at Santa Barbara; and  $72^{\circ}$  at San Diego.

Sierra Madre is, therefore, $6^{\circ} 5'$ warmer in January than .....	Atlas Peak.
Sierra Madre is, therefore, $11^{\circ} 5'$ warmer in January than .....	Blake's.
Sierra Madre is, therefore, $4^{\circ} 5'$ warmer in January than .....	Los Angeles.
Sierra Madre is, therefore, $3^{\circ} 5'$ warmer in January than .....	Santa Barbara.
Sierra Madre is, therefore, $5^{\circ} 5'$ warmer in January than .....	San Diego.
Sierra Madre is, therefore, $2^{\circ}$ warmer in July than .....	Atlas Peak.
Sierra Madre is, therefore, $3^{\circ}$ warmer in July than .....	Blake's.
Sierra Madre is, therefore, $1^{\circ}$ warmer in July than .....	Los Angeles.
Sierra Madre is, therefore, $8^{\circ}$ warmer in July than .....	Santa Barbara.
Sierra Madre is, therefore, $4^{\circ}$ warmer in July than .....	San Diego.

As compared with the Sacramento Valley, Sierra Madre, in January, is  $11^{\circ} 5'$  warmer than Sacramento, and in July,  $3^{\circ}$  warmer. The latter, as just now stated, may be due to a faulty exposure of the thermometer.

The range of the monthly means between January and July is: For Sierra Madre,  $26^{\circ} 5'$ ; for Los Angeles,  $23^{\circ}$ ; for Blake's,  $28^{\circ}$ ; for Atlas Peak,  $24^{\circ}$ ; for Santa Barbara,  $15^{\circ}$ ; for San Diego,  $21^{\circ}$ . The greater thermometric range at the Sierra Madre is accounted for by the increased heat of Summer, not the greater cold of Winter. The table shows the temperature of this place to be occasionally much higher than this. The mean of the monthly means for six years, in August, was  $77^{\circ} 7'$ ; for September,  $76^{\circ} 7'$ ; and in August, eighteen hundred and seventy-one, and again in December, eighteen hundred and seventy-five, the monthly mean was as high as  $61^{\circ}$ .

Admitting the absence of any circumstances to give inaccuracy to the observations, especially as to the maximum temperatures, the same result is not uncommon in the foothills of almost all our mountain ranges, yet the atmosphere is seldom oppressive, and the heat is less severely felt than even much higher temperatures in the more humid localities of the valleys. These extremes, too, are of but short daily duration, and, by virtue of the rapid radiation and evaporation going on in these elevated regions, speedily give way to a more moderate and delightfully refreshing temperature. By midday, moreover, a gentle breeze floats in from the ocean, tempered in its chilliness and deprived of very much of its humidity, by its passage over the valley for a distance of more than thirty miles.

In the absence of humidity tables, this important climatic element cannot be accurately ascertained, but the atmosphere may be safely set down as being *dry*.

Malarial fevers never prevail at this place. This is the testimony of all who are familiar with it.

Other locations, less improved, but equally eligible in a sanitary point of view, can be obtained in the immediate vicinity of the Sierra Madre Villa, on the same mountain range. One, at present the property of Mrs. L. Hall, was brought to the notice of the committee. It consists of  $233\frac{7}{10}\%$  acres—sixty acres being tillable land. It has excellent pasturage, an abundance of pure water, and a large

orchard, containing fruit trees of almost every variety. There are some buildings on the premises of not much value. A stream runs through the place, affording sufficient water, it is said, for the irrigation of a "section of land," and, in addition, an "undeveloped" spring capable of yielding as much more. The water supply, we learn, has been determined at  $12\frac{1}{2}$  miner's inches, under the usual 4-inch pressure—equal to about 160,000 gallons for every twenty-four hours. The price set upon the place is \$10,000.

The region of country here is believed to be a favorable one for those suffering from pulmonary complaints, well adapted as a residence for the consumptive, in the early period of disease, while its other advantages—the local scenery, the beautiful landscape, embracing the Valley of San Gabriel and the neighboring hills—render it exceedingly attractive.

Should a hospital for consumptives be located in the southern portion of the State, the vicinity of the Sierra Madre Villa would seem to be well suited to the purpose.

#### SAN DIEGO.

The climate of San Diego presents many features of peculiar interest in a sanitary point of view, due to the location of the place on the eastern border of the Bay of San Diego and to the topography of the region. The highest portion of the town is said to lie at an elevation of about sixty feet above the sea, and about four or five miles distant.

San Diego has long been regarded as among the most favorable of the many places of resort which Southern California affords. Its climate partakes generally of that of the coast localities, modified by its topography and distance from the ocean. Its mean temperature, according to the tables of the Smithsonian Institute, arrived at by means of observations taken during nearly twenty-one years, is  $62.11^{\circ}$ ; while the annual range is given by the same authority at  $19^{\circ}$ — $9^{\circ}$  greater than at San Francisco. The mean temperature of Spring is given at  $60.14^{\circ}$ ; of Summer,  $69.67^{\circ}$ ; of Autumn,  $64.55^{\circ}$ ; and of Winter,  $54.09^{\circ}$ —showing a difference of only  $15.58^{\circ}$  between the Winter and Summer, yet the greatest difference between any two consecutive months is only  $6.12^{\circ}$ —October and November. These figures are not materially different from those given by the chart for eighteen hundred and seventy-six.

The prominent climatic features of the place may be stated to be an equable Summer temperature, with light winds from the west and northwest, and an agreeable range between day and night, while the Winter is so mild that frost seldom does damage to vegetation.

It has been shown above that the mean Winter temperature for twenty-one years was only  $54.09^{\circ}$ . Comparing this with the same mean for other coast localities, we find it  $4.09^{\circ}$  higher than at San Francisco,  $0.86^{\circ}$  and  $4.18^{\circ}$  less than at Santa Barbara and Los Angeles respectively. The northwest winds appear to be more apt to prevail and attain a higher velocity at this season, or, at least, from January to April, though they seem to be only exceptionally disagreeably severe (Dr. Hoffman, on Climate of San Diego). The humidity of the place is due mainly to its proximity to the coast, but this is considerably less than at some other more northern settlements. It is this element of the climate—its lower relative humidity—which

has seemed to constitute one of the chief advantages of this section of the State, in a sanitary point of view, in the Winter season especially, over other towns along the coast.

To this must be added the mildness of the temperature and its exemption from sudden extremes.

The town itself—New San Diego—seems to the temporary observer to be less favorably located as a resort for those suffering with phthical disorders than are Old Town, or the projected localities of Roseville and La Playa. The latter are upon the western border of the bay with a range of hills intervening towards the ocean, and are much more protected from the winds which sweep in either from the northwest or southwest.

The country in the interior from San Diego for a number of miles is an elevated mesa, susceptible of the highest cultivation. Beyond, in the hills, the climate is said to be much more dry, less subject to the winds, and many locations may be found possessing in a very marked degree, the elements to be sought for as a residence for the invalid.

To the kindness of a member of the San Diego Society of Natural History, we are indebted for the following table containing meteorological statistics collected at a few of the prominent points in the interior:

	JANUARY, 1876.					JULY, 1876.				
	San Diego	El Cajon	Valle de las Vigas	Pine Valley	Julian	Oakwood	San Diego	El Cajon	Valle de las Vigas	Julian
Mean temperature	51	47	42	36	38	47	65	67	72	66
Maximum temperature	65	65	62	56	55	55	74	95	100	94
Minimum temperature	39	30	30	17	28	32	57	54	52	56
Monthly range	26	35	22	39	27	33	17	41	48	38
Greatest daily range	22	31	20	39	23	26	13	33	32	31
Mean daily range	13	19	14	18	11	13	10	20	23	23
Mean of hottest day	59	58	59	47	47	56	69	75	83	75
Mean of coldest day	48	43	42	30	30	40	62	63	58	62
Mean relative humidity	77	86	66	69	77	74	59	73	52	72
Lowest relative humidity	37	44	19	19	32	19	28	23	22	31
Rain, in inches	2.47	3.83	4.00	7.04	11.64	6.17	0.65	0.02	0.01	0.0
Number rainy days	10	12	9	13	11	12	1	1	1	0
Prevailing winds	NW	SW	W	S	S	N	W	W	W	SW
Number cloudy days	3	4	4	4	5	1	12	5	5	5
Altitude, feet	62	500	2500	4200	4500	800	5	12	26	40
Distance from sea, miles	5	12	26	40	40	17	5	12	26	40

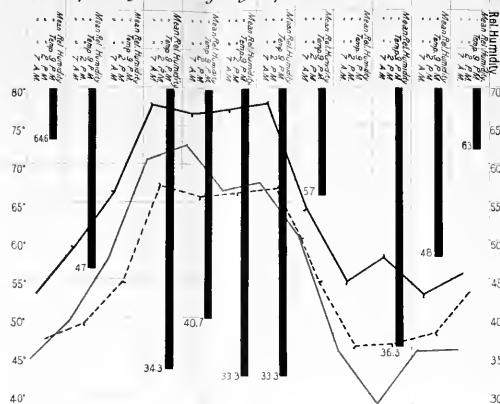
There are no intervening hills between Julian and the sea, the descent being gradual. Pine Valley is about eight miles to the seaward of the crest of the mountain plateau on which it stands. Protection from the north and northeast winds is afforded by the ridge of mountains extending easterly from the Santa Rosa Range, giving, as remarked in the notes furnished us, "the west half of San Diego County the form of an extensive amphitheater, the point of convergence being the bay. Directly under the lee of the Santa Rosa and Santa Marguerita hills, vegetation is much earlier than elsewhere, \* \* \* grasses covering the valleys with a carpet of green, while to the southward, on the hills and mesas surrounding the bay, the seeds have hardly begun to germinate." Local differences of topography occasion local variations in the climate of the high mesa

# CHART OF TEMPERATURE AND HUMIDITY.

## ATLAS PEAK.

Mean Temperature and Humidity at Atlas Peak, Napa Co.  
1876 and 1877. Elevation 1500 Ft.

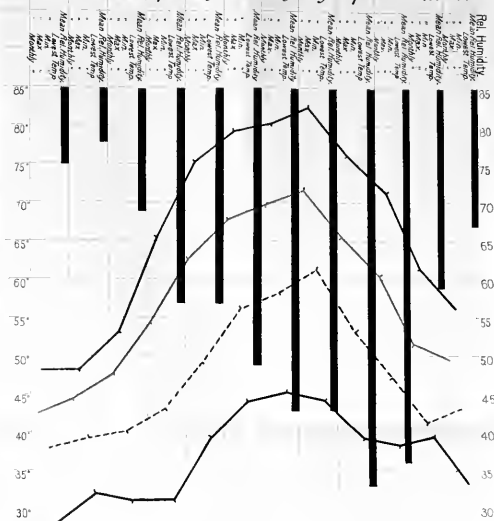
Jan. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb.



## BLAKE'S.

Temperature and Humidity at Blake's Savdarium,  
St. Helena Mountain. 1878. Elevation 2100 Ft.

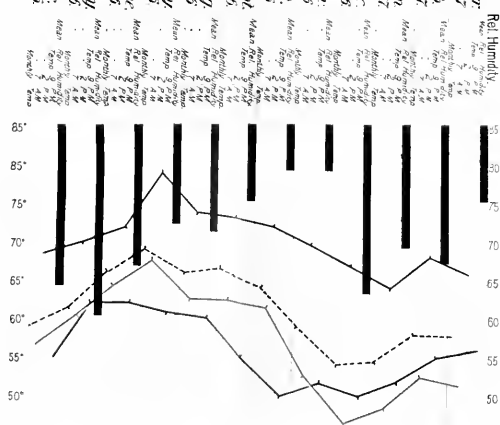
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.



## SANTA BARBARA.

Mean Temperature and Humidity. 1876 and 1877.

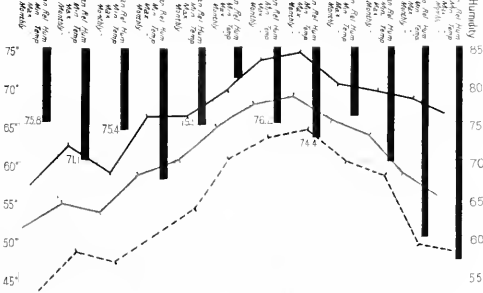
Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb.



## SAN DIEGO.

Mean Temperature and Humidity 1876.

Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.





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nearer the bay, due to the greater or less protection from the ocean winds.

That the climate of San Diego and its surroundings does exert a favorable influence over some forms of phthisis in the early stage, there can be no doubt. Abundant evidence of the fact is shown by the history of many persons now resident there—histories which seem to include among other factors the one all important one of a correct diagnosis. A greater number of such cases may be met there than in almost any other portion of the State. Such, too, is the testimony of the intelligent medical gentlemen living there, and to whose courtesy and assistance the thanks of the committee are due.

As compared with Summit Hill (Sierra Madre Villa) in Los Angeles County, the temperature of San Diego is, according to the table given above,  $11^{\circ}$  less in July, and  $5.5^{\circ}$  less in January; the range between these two months is  $5.5^{\circ}$  greater at Summit Hill than at San Diego. Even as compared with Atlas Peak, while the mean temperature of the latter is  $1^{\circ}$  less in January, and  $9^{\circ}$  greater in July than at San Diego, the range has been shown to be  $14^{\circ}$  greater; in fact, the extreme annual range of the thermometer, taking the months of January and July as a basis, is less at San Diego than at any point now under review, from which statistics have been received.

These results differ slightly from those obtained by a comparison of the figures given by Jno. S. Hittell, and which were used when remarking upon the climate of Summit Hill.

There is a similar discrepancy in the records of humidity, which the table gives at 77 per cent in January for San Diego, and 59 per cent in July. Using these figures, we find the relative humidity at San Diego to be 20 per cent greater in January than at Atlas Peak, and 18.3 per cent greater in July.

Low fogs seldom visit San Diego, but the upper atmosphere is often misty in the early morning, the sky brightening by nine or ten o'clock A. M. Such was the case for two or three days in August of the present year.

Strong winds are not common. The prevailing direction of the current is from the northwest and west, increasing in velocity from early morning until three or four o'clock P. M., when they gradually decline to a gentle breeze.

During the hours of highest temperature, the air is not oppressive; the nights are cool and refreshing.

Malarial fevers do not originate here.

The average rainfall is nine inches.

Probably certain localities east of the town, further removed from the ocean, might be even better suited to the consumptive, than just on the bay.

The lesson taught by this investigation is one which it would be well to bear in mind in all our speculations as to the influence of climate with its several factors of elevation, temperature, and humidity, that no invariable or arbitrary rule can be with certainty laid down, and that other circumstances, not readily recognized or understood, do sometimes concur in upsetting our wisest theories, or appear as formidable exceptions to even the legitimate deductions of experience.

Yet, however true it may be that the climate of San Diego is superiorly adapted to certain forms and stages of consumption, it is believed that the theorems as laid down in a preceding part of this

report, as to the efficacy of elevation and atmospheric dryness and temperature, will be found to be true as a general rule—a rule, as just stated, not without exceptions, and one of the most prominent of these is the vicinity of San Diego.

#### SUMMARY.

With so many locations before them, all of them more or less favorable in respect of climate, it is by no means easy for the committee to award superiority to any one upon this single consideration. The question of accessibility assumes an importance beyond that which would ordinarily attach to it, and, taken in connection with adaptability to outdoor life, and especially to outdoor labor, must necessarily exercise almost a controlling influence.

Keeping in view, however, the principles laid down in the beginning of this report, we ought to endeavor to obtain a location whose climate is neither too cold in Winter nor too warm in Summer—presenting a happy medium between these two extremes.

Such a climate is that of San Diego; but it lacks, at least for a very large number of invalids, the important elements of elevation and Summer dryness. Its inaccessibility, too, by the present means of conveyance, is such as would seem scarcely to justify its selection. The cost of transportation from the northern and central portions of the State would constitute a very considerable item of expense.

This latter objection, in a minor degree, rests against the Sierra Madre Range, near Los Angeles, which otherwise presents advantages unexcelled by those of any other portion of the State visited by the committee. In a very short time, if the hospital now under contemplation be established and prove successful, another similar institution will, almost of necessity, be demanded by the southern portion of the State. The opening of communication with the Atlantic States by railroad, through Arizona, will give impetus to immigration by that route, and Los Angeles must become, in consequence of the many attractions it presents, social, agricultural, and climatic, its rendezvous. As now with the other route, so will it be with this—many of those who come will be adventurers in search of health; victims of pulmonary disease; friendless and moneyless, and a hospital in the northern part of the State would be quite as inaccessible to them as would such an institution at Los Angeles now be to the people of the northern and central counties. The committee feel themselves scarcely justified, however, in anticipating this condition of things, and of giving it preponderating weight in their deliberations. Were the question now one involving the establishment of *two* hospitals, there would be less embarrassment.

The same factor, inaccessibility, must be urged against Ojai Valley and Santa Barbara, each of which presents many advantages during certain portions of the year for the consumptive, at that stage of the disease in which benefit from any climate may be expected.

Of the different localities visited in Napa Valley, we have regular meteorological reports from only one—Atlas Peak. These are suggestive of a climate admirably suited to the class of diseases under consideration. It has a mean temperature in July of 74°, and in January, 50°; a mean relative humidity for the warm months of 39 per cent., and for the cool months, 51 per cent., or an annual mean of 45 per cent. It has a moderate elevation, within a medium which

adapts it to the largest class of invalids, and it is said to be quite exempt from fogs, and from the winds which often sweep the valley. There is an abundance of water, with a little labor there may be procured shade for tents and recreation, and there is an adaptability to outdoor life and labor during almost the entire year. In this respect, as in the location and character of the land, it is superior to any seen in this section of the State. The road from Napa City to this place can with slight expense be made an excellent one.

There is a distinction to be made between a Winter climate suitable for consumptives and a proper Summer climate. As a rule, San Diego would represent one of the very best localities for the first, and Santa Barbara might be ranked with it; the mountains, at suitable elevations, give us the latter. In some respects Atlas Peak is a representative of both, as far as can be determined by meteorological statistics. If we had equally as exact statistics of the climate of the other points in this county visited by the committee, perhaps the same might be said of some of them.

Of the other localities in the same county we have a partial record of temperature, through Mr. Wing, of Veeder Mountain. The estimate made of its humidity is theoretical to some extent, yet probably correct. It is doubtless sufficiently dry, and, if we may credit the statement of Mr. Wing, it is quite exempt from fogs. The elevation (2,300 feet) brings it within the desired limits. There is some foundation for the opinion advanced by Dr. Blake, that the redwood never flourishes except in the region of fogs, yet it appears to be contradicted by the experience of Mr. Wing, just stated. It is probable that they are quite exceptional here, at least in that portion of the tract of land in the vicinity of the house.

Howell Mountain, about six miles from Blake's Sanitarium, but probably two or three hundred feet lower, does not differ materially in temperature from the latter, though no records are available; while Troutdale, in the opinion of the committee, though of a somewhat lower altitude, affords advantages otherwise quite equal to those of Howell Mountain in respect of climate. Both of these places are well timbered, and have an abundance of pure, clear water. They are both sufficiently accessible.

The only locality visited in Lake County was Lakeport, to which reference has been already made. Doubtless its climate would render it a suitable place for a hospital for consumptives. There is probably no region in the central portion of the State more frequented by invalids, especially those with pulmonary disease. Possibly the reputation of the mineral springs, so abundant in the vicinity, may have stimulated the movement of invalids there, and formed one of its popular attractions; but beyond these—before these were very widely known—it had obtained recognition for the excellence of its climate, and its superiority as a sanitary resort for the consumptive had been fully attested by a number of cases in which the progress of disease seemed to have been completely arrested.

With the present means of travel, however, Lakeport, in the opinion of the committee, would be too inaccessible to the great majority of the proper subjects for treatment in the institution under contemplation. The committee are uninformed as to the number of consumptive patients now thrown upon the charity of the county, but at the most, they must fall far short of the great number to be found in other

counties to whom some of the other localities named above would be more accessible.

The following chart of the meteorology of some of the locations referred to above will fairly exhibit their most prominent features.\*

Taking into consideration all the facts presented in the foregoing pages, and, where other things are equal, the relative accessibility of the different localities visited, the committee feel justified in awarding a preference to Atlas Peak, in Napa County. The meteorological records kept at this place, and to which your committee have had access, afford a more correct basis for an intelligent estimation of its prominent climatic features than the unsupported though doubtless conscientious testimony obtained in regard to others.

While thus expressing a preference for Atlas Peak, the committee are compelled in justice to admit the claims, in some respects quite equal, of other localities in Napa County, and it has been with much diffidence, and only after a full, careful, and, they believe, unprejudiced deliberation, that they have arrived at a conclusion.

The decision of the committee has been made with reference to a single hospital convenient to the population of the greater portion of the State. The time will probably come when additional accommodations will be required for the southern counties, from which a hospital in Napa County would be too remote to be made generally available. Should such a necessity arise, we have already in this report expressed a preference for the Sierra Madre Range, near Los Angeles.

With this general review of the prominent localities visited by the committee, and the expressed judgment as to the selection to be made, we pass to a very brief consideration of the other subjects included in the resolution under which we act.

The requirements of a sanitarium for consumptives involve, above all things, a suitability to out-of-door life, and a certain amount of exercise. While a comfortable home is to be provided for all, and indoor apartments for those requiring them, the modern view of the treatment of consumptives enjoins upon all capable of adopting it a life as much as possible in the open air, and exercise within the limit prudent for each individual. In inviting the unfortunate victims of this disease to a home provided by the State, it is not to be supposed that they go there for the enjoyment of a life of ease and indolence. The benefit of climate alone would, under such circumstances, be inconsiderable, and a charity so beneficent would fail of its highest purposes.

Among the regulations proper to be adopted, therefore, would be the apportionment among the inmates of a certain amount of work, such work as a very large proportion of those who would be likely to

\* EXPLANATION.—The red lines on chart, for Blake's and San Diego, indicate the mean monthly temperature; for Atlas Peak and Santa Barbara, they indicate the mean temperature at 7 A. M. The dotted lines, for Blake's and San Diego, show the mean minima of temperature; for Santa Barbara, the mean monthly temperature; and for Atlas Peak, the mean at 9 P. M. The chart is in error in transposing the broad black line for relative humidity at Atlas Peak to the space properly occupied by the 9 P. M. temperature—an error which brings the 7 A. M., and 2 P. M. temperatures out of their proper places. In other words, the headings, "Mean Rel. Humidity, Mean Temp. 9 P. M., Mean Temp. 2 P. M., and Mean Temp. 7 A. M.," should each be moved one space to the left. The plain black curved line indicates, therefore, the mean temperature at 2 P. M. instead of at 7 A. M., as appears on the chart. The upper black curve, for Santa Barbara, shows the mean temperature at 2 P. M.; at Blake's and San Diego, the mean maxima. The lower black curve, for Santa Barbara, indicates the 9 P. M. temperature; at Blake's, the lowest temperature experienced during the month.

apply for admission could perform, not only without detriment, but with positive benefit; work not irksome and unpleasant, but light and agreeable; work so adapted to the individual and his tastes and inclinations, as well as to his physical condition, as to afford occupation for the mind and exercise for the body. Probably, by the labor thus obtained, most of the light work about the place could be performed—in the field, in the garden, in improving and beautifying the grounds.

Much of the success of an institution of this kind must depend upon the ability and discretion of the medical Superintendent, his judgment as to the amount and kind of work proper to be performed by each individual, his discernment of character, and his skill in the detection of impostors or malingerers.

The accommodations required for a hospital like that under contemplation would be simple and, as compared with the elaborate architecture of other hospital buildings, inexpensive. A great many of the patients would probably be benefited by sleeping in tents, or in the open air, in suitable places, and when the weather permitted. It is remarkable how unlikely consumptives are to take cold while sleeping in the open air.

But buildings would be required for the officers and attachés of the institution, as well as for those for whom the occupation of tents would be imprudent, and for all during inclement weather.

An arrangement similar to that recommended for convalescent hospitals would seem suitable for the institution proposed. This is explained by a recent author, Wylie: "An administrative building, containing the necessary offices and dwelling-rooms for the Superintendent. Connected with this, in the rear, should be a general kitchen and two dining rooms—one for each sex. On either side of this administrative building, there should be a long row of simple cottages, connected with the dining rooms by a covered way. These huts should be about twenty-five feet square and ten feet to the eaves, with windows on three sides, and should contain four beds each. No drainage pipes should be laid on in these cottages. Special arrangements at some distance, should be made for water-closets, and, when necessary, earth-closets could be used in the huts. In selecting the occupants for each hut, the strong should be put with the weaker patients and compelled to take care of them to a certain extent, by keeping their quarters clean, etc." By this arrangement, males and females are separately provided for.

In the proposed plan for "quarters" for the patients, the danger of foul air, or gases from sewers or cesspools, would be entirely avoided. No general ward or wards, in which the patients are to sleep and live, are provided; thus avoiding contamination of the atmosphere of the sleeping apartment as well as the discouraging effects upon the mind, resulting from the promiscuous association of those in different stages of disease—effects which can be only bad when those in curable stages are placed in close proximity to the incurable.

A general ward—probably two, one for each sex—might be required for accidental diseases liable to arise in a community as large as this would probably be; and this could be erected, of simple and inexpensive construction, separately from the other buildings. The cottages might be arranged for six or eight beds without interfering with the general plan, or adding greatly to the expense.

The structures contemplated might be plain and cheap, without

superfluous ornamentation. The extent to which accommodations, such as tents, cottages, or sleeping apartments, dining-room facilities, etc., are to be provided, cannot be determined with any degree of accuracy, and hence the cost of the undertaking must be, for the present, conjectural. These things would depend upon the number of patients admitted, and, to a very great extent, upon the judgment of the Superintendent—his discrimination and his skill in preventing the practice of deceit and imposition.

In the seventeen hospitals reporting to the State Board of Health for the year ending July first, eighteen hundred and eighty, seventy-two cases of consumption were admitted during the year. At the City and County Hospital in San Francisco, there were, in addition, two hundred and ten cases admitted, making a total of two hundred and eighty-two cases admitted to hospital treatment. These do not include all the cases admitted to the hospitals, for a considerable number of these institutions have made no report even of this one item. Among these, are the important ones of Alameda and Los Angeles.

It is not probable, however, that all who seek admission to the county hospitals would enter a hospital for consumptives. Some would apply too late to bear removal. But, on the other hand, an asylum for consumptives having been established, it is to be expected that many who, as long as possible, avoid the proffered charities of the counties, would seek at an early day the benefits to be afforded by the purer air, the better climate, the more exact sanitary regulations of the State institution. Right here, in the opinion of the committee, lies one of the most serious objections which can be urged against the establishment of such a hospital—the temptation it would afford to unworthy persons, to an influx of the phthisically disposed from neighboring States, and the consequent abuse of a most beneficent and noble charity. All these things could be avoided, however, by judicious regulations and strict terms of admission, and their faithful enforcement by the proper authorities. The nature of these regulations should be a subject for future consideration, and is not included under the duties assigned to this committee. By the adoption and observance of proper rules, governing not only the admission of patients, but their habits, their modes of life, their exercises, their labor, it is believed that the institution proposed would prove a most worthy and successful charity, sustained at an expense quite inconsiderable, when compared with the immensity of the benefits it would be the means of dispensing.

Respectfully submitted, for the committee.

F. W. HATCH, M. D.

H. GIBBONS, M. D.,  
W. R. CLUNESS, M. D.,

Concurring.

## HEALTH LAWS OF THE STATE OF CALIFORNIA.

## POLITICAL CODE OF THE STATE OF CALIFORNIA.

## PART III—TITLE VII.

## CHAPTER II.

## PRESERVATION OF PUBLIC HEALTH.

## ARTICLE I. STATE BOARD OF HEALTH.

## II. VACCINE AGENT.

## III. HEALTH AND QUARANTINE REGULATIONS FOR THE CITY AND HARBOR OF SAN FRANCISCO.

## IV. HEALTH REGULATIONS FOR THE CITY OF SACRAMENTO.

## V. HEALTH AND QUARANTINE OF OTHER CITIES, TOWNS, AND HARBORS.

## ARTICLE I.

## STATE BOARD OF HEALTH.

## SECTION 2978. Who constitute the State Board.

## 2979. Duties of.

## 2980. To report as to the effect of intoxicating liquors.

## 2981. Time and place of meeting. To elect President and Secretary. No member, except the Secretary to receive compensation.

## 2982. Duties of Secretary. Salary of Secretary.

## 2983. Expenses of, limited.

*Who constitute the State Board.*

2978. The State Board of Health consists of seven physicians—two of the City of Sacramento, and five from other portions of the State—appointed by the Governor for the term of four years.

*Duties of.*

2979. The State Board of Health must place themselves in communication with the local Boards of Health, hospitals, asylums, and public institutions throughout the State, and take cognizance of the interests of health and life among the citizens generally. They must make sanitary investigations and inquiries respecting the causes of disease, especially of epidemics, the source of mortality, and the effects of localities, employments, conditions, and circumstances on the public health, and gather such information in respect to these matters as they may deem proper for diffusion among the people. They may devise some scheme whereby medical and vital statistics of sanitary value can be obtained, and act as an Advisory Board to



the State in all hygienic and medical matters, especially such as relate to the location, construction, sewerage, and administration of prisons, hospitals, asylums, and other public institutions. They must, at each biennial session of the Legislature, make a report, with such suggestions as to legislative action as they deem proper.

*To report as to the effect of intoxicating liquors.*

2980. The Board must examine into and report what, in their best judgment, is the effect of the use of intoxicating liquor as a beverage upon the industry, prosperity, happiness, health, and lives of the citizens of the State; also, what legislation, if any, is necessary in the premises.

*Time and place of meeting—to elect President and Secretary. No member except the Secretary to receive compensation.*

2981. The Board must meet at the Capital of the State, at least once in every three months. They must elect from their own number a President and a Permanent Secretary; the latter must reside at the Capital, and is their executive officer. No member, except the Secretary, receives any compensation; but the actual traveling expenses of the members, while engaged in the duties of the Board, are allowed, and paid out of the General Fund.

*Duties of Secretary. Salary of Secretary.*

2982. The Secretary must superintend the work and perform such other duties as the Board may require. He must furnish the Legislature, when in session, such information cognate to this chapter as, from time to time, may be necessary. An annual salary of twenty-five hundred dollars, and his office and other necessary expenses incurred in the performance of his duties, must be paid to him in the same manner as salaries of State officers are paid.

*Expenses of, limited.*

2983. The expenses of the Board, including the salary of the Secretary, must not exceed four thousand dollars per annum.

## ARTICLE II.

### VACCINE AGENT.

SECTION 2993. Agent to obtain genuine vaccine matter.

2994. Compensation and duty of.

*Agent to obtain genuine vaccine matter.*

2993. The Vaccine Agent must obtain a supply of the genuine vaccine matter, and preserve the same for the use and benefit of the citizens of this State.

*Compensation and duty of.*

2994. Such agent must furnish genuine vaccine matter, approved by the State Board of Health, to any regular practicing physician in good standing in his profession in this State. He may charge and receive for every parcel of vaccine matter furnished the sum of five dollars, which is in full compensation for his services and expenses.

## ARTICLE III.

## HEALTH AND QUARANTINE REGULATIONS FOR THE CITY AND HARBOR OF SAN FRANCISCO.

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*Quarantine grounds, location of.*

3004. The quarantine grounds of the Bay and harbor of San Francisco are at the anchorage of Saucelito.

*Board of Health of San Francisco, how constituted. Term of office.*

3005. The Board of Health for the City and County of San Francisco consists of the Mayor of the city and county, and four physicians, in good standing, residing in the City and County of San Francisco, appointed by the Governor, and holding their offices for the term of five years.

*Mayor ex officio President. Time of meeting.*

3006. The Mayor is ex officio President of the Board. The Board must meet monthly, and at such other times as the President may direct. In the absence of the President, the Board may elect a Chairman, who is clothed with the same powers as the President.

*Health Officer—His election.*

3007. The Health Officer for the City and County and port of San Francisco is elected by the Board of Health, and holds office at its pleasure. He must be a graduate of some medical college, in good standing, and must reside within the city limits of San Francisco.

*Power of Health Officer.*

3008. The Health Officer is the executive officer of the Health Department, and he may, in his discretion, cause the removal to a hospital of any and all persons, within the limits of the City and County of San Francisco, infected with variola.

*Board to appoint certain officers and employés.*

3009. The Board of Health must appoint a Quarantine Officer, who shall be a physician in good standing, a Secretary, one Assistant Secretary, six Health Inspectors, one Market Inspector, and one Messenger, whose duties must be fixed by the Board of Health. They must also appoint one Superintendent Physician, one Resident Physician, one Steward, one Matron, one Apothecary, two Visiting Physicians, two Visiting Surgeons, as officers of the City and County Hospital in and for the City and County of San Francisco, one each of said Visiting Physicians and Surgeons to be nominated by the Faculty of the Medical Department of the University of California, and one each of said Visiting Physicians and Surgeons to be nominated by the Medical College of the Pacific. Said Board may also appoint one Engineer for the City and County Hospital. They may also appoint one Superintendent, one Resident Physician, one Matron, and such other employés as are now authorized by law, to be employed in and for the Almshouse of said city and county. They shall also have power to appoint and prescribe the duties of one City Physician and one Assistant City Physician, who shall be designated as Police Surgeons, and whose duty it shall be to make all autopsies required of them by the Coroner of said city and county. And said Board is also empowered to appoint such employés and such medical attendants as they may deem necessary in the Health Department, and in all the various institutions which are, by law, placed under their supervision; and the compensation of such employés and medical attendants shall be fixed by the Board of Health. The appointing power aforesaid is vested solely in said Board of Health, and said Board shall have power to prescribe the duties of said appointees, and shall not remove the same without just cause. The heads of departments appointed by the Board of Health, to wit, the Health Officer, Resident Physician of City and County Hospital, and Superintendent of Almshouse, shall not be removed, except by a concurrence of four members of said Board of Health.

*Salaries allowed to officers and employés of Health Department.*

3010. The following annual salaries are hereby allowed to the officers of the Health Department, and such other officers and employés as are mentioned in the preceding section, viz.: Health Officer, three thousand dollars; Quarantine Officer, eighteen hundred dollars; Secretary, twenty-one hundred dollars; Assistant Secretary, twelve hundred dollars; Health Inspectors, twelve hundred dollars each; Market Inspector, twelve hundred dollars; Messenger, nine hundred dollars; City Physician, eighteen hundred dollars; Assistant City Physician, twelve hundred dollars; all of said salaries, together with the salaries of such other employés of the Health Department as may be appointed by the Board of Health, must be paid in equal monthly installments out of the General Fund of the City and County of San Francisco, in the same manner as the salaries of the other officers of said city and county are paid. There shall be paid to the officers and employés of the City and County Hospital and Almshouse the following annual salaries, viz.: Superintendent Physician, twenty-four hundred dollars; Resident Physician, fifteen hundred dollars; Steward, fifteen hundred dollars; Matron, seven hundred and twenty dollars; one Apothecary, twelve hundred dollars; Visiting Physicians and Surgeons, twelve hundred dollars each;

Engineer, twelve hundred dollars; Superintendent of Almshouse, twenty-four hundred dollars; Resident Physician of Almshouse, fifteen hundred dollars; Matron of Almshouse, seven hundred and twenty dollars; and all other medical attendants and employes of said institutions are to be paid such sums as may be authorized by law, and as provided in the preceding section; all to be paid in equal monthly installments out of the Hospital and Almshouse Fund of said City and County of San Francisco; and the Auditor of said city and county is hereby directed to audit the said demands, payable out of the funds aforesaid, upon the approval of the same by the said Board of Health, and also to audit all demands for salaries of medical attendants and employes appointed by the Board of Health in accordance with this Chapter, for the amounts authorized to be paid, when the same shall have been approved by said Board; and the Treasurer of said city and county must pay said demands out of said funds. The Clerk of the Mayor of the City and County of San Francisco shall not receive any compensation as Clerk of the Board of Health.

*Expenses of Health Officer.*

3011. The Health Officer, in addition to his salary, receives such sums for the necessary expenses of his office as the Board of Health may direct, and the Auditor must audit and the Treasurer pay such sums out of the General Fund. The Board of Supervisors must provide proper offices for the Health Department.

*General powers of Board of Health.*

3012. The Board of Health have general supervision of all matters appertaining to the sanitary condition of the city and county, including the City and County Hospital, the County Jail, Almshouse, Industrial School, and all public health institutions provided by the City and County of San Francisco; and may adopt such orders and regulations, and appoint or discharge such medical attendants and employes, as to them seems best to promote the public welfare; and may appoint as many Health Inspectors as they deem necessary in time of epidemics.

*Shipmasters to report infected vessels.*

3013. Shipmasters bringing vessels into the Harbor of San Francisco, and masters, owners, or consignees having vessels in the harbor which have on board any cases of Asiatic cholera, smallpox, yellow, typhus, or ship fever, must report the same, in writing, to the Quarantine Officer before landing any passengers, casting anchor, or coming to any wharf, or as soon thereafter as they, or either of them, become aware of the existence of either of the diseases on board of their vessels.

*Passengers and freight not to be landed without permit.*

3014. No captain or other officer in command of any vessel sailing under a register, arriving at the port of San Francisco, nor any owner, consignee, agent, or other person having charge of such vessel, must, under a penalty of not less than one hundred dollars nor more than one thousand dollars, land, or permit to be landed, any freight, passengers, or other persons from such vessel until he has

reported to the Quarantine Officer, presented his bill of health, and received a permit from that officer to land freight, passengers, or other persons.

*Duties of pilots.*

3015. Every pilot who conducts into the port of San Francisco any vessel subject to quarantine or examination by the Quarantine Officer, must :

*One*—Bring the vessel no nearer the city than is allowed by law.

*Two*—Prevent any person from leaving, and any communication being made with the vessel under his charge, until the Quarantine Officer has boarded her and given the necessary orders and directions.

*Three*—Be vigilant in preventing any violation of the quarantine laws, and report, without delay, all such violations that come to his knowledge, to the Quarantine Officer.

*Four*—Present the master of the vessel with a printed copy of the quarantine laws, unless he has one.

*Five*—If the vessel is subject to quarantine, by reason of infection, place at the mast-head a small, yellow flag.

*Penalty for neglect of masters of vessels to comply with sanitary regulations.*

3016. Every master of a vessel subject to quarantine or visitation by the Quarantine Officer, arriving in the port of San Francisco, who refuses or neglects, either :

*One*—To proceed with and anchor his vessel at the place assigned for quarantine, when legally directed so to do; or,

*Two*—To submit his vessel, cargo, and passengers to the Quarantine Officer, and furnish all necessary information to enable that officer to determine what quarantine or other regulations they ought respectively to be subject; or,

*Three*—To report all cases of disease and of deaths occurring on his vessel, and to comply with all the sanitary regulations of the bay and harbor;

Is liable in the sum of five hundred dollars for every such neglect or refusal.

*Vessels from infected ports subject to quarantine.*

3017. All vessels arriving off the port of San Francisco from ports which have been legally declared infected ports, and all vessels arriving from ports where there is prevailing, at the time of their departure, any contagious, infectious, or pestilential diseases, or vessels with decaying cargoes, or which have unusually foul or offensive holds, are subject to quarantine, and must be, by the master, owner, pilot, or consignee, reported to the Quarantine Officer without delay. No such vessel must cross a right line drawn from Meiggs Wharf to Alcatraz Island until the Quarantine Officer has boarded her and given the order required by law.

*Examination and inspection of infected vessels.*

3018. The Quarantine Officer must board every vessel, subject to quarantine or visitation by him, immediately on her arrival, make such examination and inspection of vessel, books, papers, or cargo, or of persons on board, under oath, as he may judge expedient, and determine whether the vessel should be ordered to quarantine, and if so, the period of quarantine.

*Passengers not to be landed without permit.*

3019. No Captain or other officer in command of any passenger-carrying vessel of more than one hundred and fifty tons burden, nor of any vessel of more than one hundred and fifty tons burden, having passengers on board, nor any owner, consignee, agent, or other person having charge of such vessel or vessels, must, under a penalty of not less than one hundred dollars nor more than one thousand dollars, land or permit to be landed, any passenger from the vessel until he has presented his bill of health to the Quarantine Officer and received a permit from that officer to land such passenger, except in such cases as the Quarantine Officer deems it safe to give the permit before seeing the bill of health.

*Fees of Health Officer.*

3020. The following fees may be collected by the Quarantine Officer: For giving a permit to land freight or passengers, or both, from any sailing vessel of less than five hundred tons burden, from any port out of this State, two dollars and fifty cents; over five hundred and under one thousand tons burden, five dollars; each additional one thousand tons burden or fraction thereof, an additional two dollars and fifty cents; for steam vessels, propelled in whole or in part by steam, of one thousand tons burden or less, five dollars, and two dollars and fifty cents for each additional one thousand tons burden or fraction thereof; but vessels not propelled in whole or in part by steam, sailing to and from any port or ports of the Pacific States, of the United States, or Territories, and whaling vessels, entering the harbor of San Francisco, are excepted from the provisions of this section.

*Compulsory vaccination.*

3021. The Board of Health may enforce compulsory vaccination on passengers in infected ships or coming from infected ports.

*Hospitals to be provided.*

3022. The Board of Health may provide suitable hospitals, to be situated at or near Saucelito, and furnish and supply the same with nurses and attachés, and remove thereto all persons afflicted with cholera, smallpox, yellow, typhus, or ship fever.

*Records of births, deaths, and interments to be kept.*

3023. The Health Officer must keep a record of all births, deaths, and interments occurring in the City and County of San Francisco. Such records, when filled, must be deposited in the office of the County Recorder, and produced when required for public inspection.

*Returns of births, deaths, etc.*

3024. Physicians and midwives must, on or before the fourth day of each month, make a return to the Health Officer of all births, deaths, and the number of still-born children occurring in their practice during the preceding month. In the absence of such attendants, the parent must make such report within thirty days after the birth of the child. Such returns must be made in accordance with rules adopted, and upon blanks furnished by the Board of Health.

*No bodies to be buried without permit—Duty of Assistant City Physician and Health Officer.*

3025. No person shall deposit in any cemetery, or inter in the City and County of San Francisco, any human body, without first having obtained and filed with the Health Officer a certificate, signed by a physician or midwife, or a Coroner, setting forth as near as possible, the name, age, color, sex, place of birth, occupation, date, locality, and the cause of death of deceased, and obtain from such Health Officer a permit; nor shall any human body be removed or disinterred without the permit of the Health Officer, or by order of the Coroner. Physicians, when deaths occur in their practice, must give the certificate herein mentioned. Hereafter it shall be the duty of the Assistant City Physician, or Police Surgeons, to perform all autopsies which may be required in the Coroner's office of the City and County of San Francisco, all such autopsies being made without charge to the city. It shall be the duty of the Health Officer to see that the dead body of a human being is not allowed to remain in any public receiving vault for a longer period than five days. At the expiration of that time he shall cause the body to be placed in a vault or niche constructed of brick, stone, or iron, and hermetically sealed. It shall also be his duty to require all persons having in charge the digging of graves and burial of the dead to see that the body of no human being who had reached ten years of age shall be interred in a grave less than six feet deep, or if under the age of ten years, the grave to be not less than five feet deep.

*Return of interments to be made.*

3026. Superintendents of cemeteries, within the boundaries of the City and County of San Francisco, must return to the Health Officer, on each Monday, the names of all persons interred or deposited within their respective cemeteries for the preceding week.

*Bodies not to be removed without permit.*

3027. No Superintendent of a cemetery can remove or cause to be removed, disinter or cause to be disinterred, any corpse that has been deposited in the cemetery, without a permit from the Health Officer, or by order of the Coroner.

*Nuisances on premises of non-residents; how abated. Power of Board of Health.*

3028. Whenever a nuisance shall exist on the property of any non-resident, or any property the owner or owners of which cannot be found by either Health Inspector, after diligent search, or on the property of any owner or owners upon whom due notice may have been served, and who shall, for three days, refuse or neglect to abate the same, or on any city property, it shall be the duty of the Board of Health to cause the said nuisance to be at once removed or abated, and to draw upon the General Fund for such sums as may be required for its removal or abatement, not to exceed two hundred dollars; *provided*, that whenever a larger expenditure is found necessary to be made for the removal or suppression of any nuisance, the Board of Supervisors of said city and county shall, upon the written application of the Board of Health, by ordinance, appropriate, allow, and order paid out of the General Fund, such sum or sums as may be necessary for that purpose, and the Auditor shall audit, and the Treasurer shall pay all appropriations of money made in pursuance of this section, in the same manner as is now provided by law for

auditing and paying demands upon the treasury ; said sum or sums so paid shall become a lien on the property from which said nuisance has been removed or abated in pursuance of this section, and may be recovered by an action against such property. And it shall be the duty of the City and County Attorney to foreclose all such liens in the proper Court, in the name of and for the benefit of said city and county, and when the property is sold enough of the proceeds shall be paid into the City and County Treasury to satisfy the lien and costs, and the overplus, if any there be, shall be paid to the owner of the property, if he be known, and if not, then into the Court for his use when ascertained. The Board of Health is hereby vested with power to act upon, define, determine, and adjudge what shall constitute a nuisance in said city and county, and to require the same to be abated in a summary manner. Any person who maintains, permits, or allows a nuisance to exist upon his or her property or premises, after the same has been determined by said Board to be a nuisance, and after notice to remove the same has been served upon such person, is guilty of a misdemeanor, and shall be punished accordingly; and each day of such existence, after notice, shall be deemed a separate and distinct offense, and it is the duty of the Health Officer to prosecute all persons guilty of violating this law by continuous prosecutions until the same is abated and removed.

*Health Officer to keep Fee Book.*

3029. The Health Officer must keep in his office a book, in which he must make an entry of all fees collected by him. He must pay all fees collected to the City and County Treasurer weekly, to the credit of the General Fund.

*Bond of Health Officer.*

3030. The Health Officer must execute an official bond, to be approved by the Board of Health, in the sum of ten thousand dollars.

*Officers empowered to administer oaths.*

3031. Any member of the Board of Health, Health Officer, or Quarantine Officer, or Secretary, or Assistant Secretary of the Health Department, is empowered to administer oaths on business connected with that department.

*Actions, in whose name maintained.*

3032. Whenever any cause of action arises under any of the provisions of this Chapter, suit may be maintained therein, in the name of the Health Officer, in any Superior Court of this State.

*Vacation of infected and dangerous houses.*

3033. Whenever it shall be certified to the Board of Health, by the Health Officer, that any building, or part thereof, is unfit for human habitation, by reason of its being so infected with disease as to be likely to cause sickness among the occupants, or by reason of its want of repair has become dangerous to life, said Board may issue an order, and cause the same to be affixed conspicuously on the building, or part thereof, and to be personally served upon the owner, agent, or lessee, if the same can be found in this State, requiring all persons therein to vacate such building, for the reasons to be stated therein as aforesaid. Such building, or part thereof, shall, within ten days



thereafter, be vacated, or within such shorter time, not less than twenty-four hours, as in said notice may be specified; but said Board, if it shall become satisfied that the danger from said house, or part thereof, has ceased to exist, may revoke said order, and it shall thenceforward become inoperative.

*Physicians to report certain cases immediately. Households to report certain cases in house.*

3034. *One*—Every physician in the city and county shall report to the Health Officer, in writing, every patient he shall have laboring under Asiatic cholera, variola, diphtheria, or scarlatina, immediately thereafter, and report to the same officer every case of death from such disease, immediately after it shall have occurred.

*Two*—Every household in said city and county shall forthwith report, in writing, to the Health Officer, the name of every person boarding or an inmate at his or her house, whom he or she shall have reason to believe sick of cholera or smallpox, and any deaths occurring at his or her house from such disease.

*Board of Health to have charge of City Cemetery.*

3035. The Board of Health shall have entire charge of the City Cemetery, and shall employ a Superintendent, at a salary of seventy-five dollars per month, the same to be paid as the salaries of other employes are paid.

#### ARTICLE IV.

##### HEALTH REGULATIONS FOR THE CITY OF SACRAMENTO.

- SECTION 3042. Board of Health, who and how appointed.  
 3043. Term and vacancies.  
 3044. Powers of the Board of Health.  
 3045. Pest houses, how located and conducted.  
 3046. Death records.  
 3047. Enforcement of regulations. Health Officer.  
 3048. Expenses, how paid.  
 3049. Compensation, how fixed.

*Board of Health, who and how appointed.*

3042. The Board of Trustees of the City of Sacramento may establish, by ordinance, a Board of Health therefor, to consist of five practicing physicians, graduates of a medical college of recognized respectability; and the President of the Board of Trustees is ex officio President of the Board.

*Term and vacancies.*

3043. The members of the Board hold their offices at the pleasure of the appointing power.

*Powers of the Board of Health.*

3044. The Board of Health of the City of Sacramento has a general supervision of all the matters appertaining to the sanitary condition of the city, and may make such rules and regulations in relation thereto as are not inconsistent with law.

*Pest houses, how located and conducted.*

3045. The Board of Health may locate and establish pest houses, and cause to be removed thereto, and kept, any person having a contagious or infectious disease; may discontinue or remove the same,

and make such rules and regulations regarding the conduct of the same as are needful.

*Death records.*

3046. The Board of Health must exercise a general supervision over the death records of the City of Sacramento, and may adopt such forms and regulations for the use and government of physicians, undertakers, and superintendents of cemeteries, as in their judgment may be best calculated to secure reliable statistics of the mortality in the city and prevent the spread of disease.

*Enforcement of regulations. Health Officer.*

3047. The Board of Trustees of the City of Sacramento must, by ordinance or otherwise, provide for enforcing such orders and regulations as the Board of Health may from time to time adopt; and in times of epidemics, or when deemed necessary by the Board of Health, a Health Officer must be employed to enforce the laws in relation to the sanitary condition of the city.

*Expenses, how paid.*

3048. All expenses necessarily incurred in carrying out the provisions of this Article, must be provided for by the Board of Trustees of the City of Sacramento, who may make appropriation therefor out of the Special Street Fund, if the same is sufficient; if not, they may by taxation provide a Fund therefor.

*Compensation, how fixed.*

3049. The Board of Trustees must fix the compensation of the Board of Health and the Health Officer.

## ARTICLE V.

### HEALTH AND QUARANTINE OF OTHER CITIES, TOWNS, AND HARBORS.

- SECTION 3059. Boards of Supervisors may adopt Article III.  
 3060. Boards of Supervisors may adopt Article IV.  
 3061. Incorporated cities or towns may adopt Articles III and IV.  
 3062. May appoint Health Officer in lieu of Board.  
 3063. Per capita or property tax, how levied.

*Boards of Supervisors may adopt Article III.*

3059. The Board of Supervisors of any county in which there is a port of entry or harbor, for which there is not otherwise provided health and quarantine regulations, may by an ordinance adopt the whole or any part of the provisions of Article III of this Chapter, appoint a Board of Health, or Health Officer, locate quarantine grounds when necessary, and provide for the enforcement of health and quarantine regulations.

*Boards of Supervisors may adopt Article IV.*

3060. In like manner the Board of Supervisors of any county in which there is an unincorporated city or town, for which there is not otherwise provided a Board of Health or health regulations in time of epidemics, or the existence of contagious or infectious diseases, may by an ordinance adopt for such city or town, in whole or in part, the provisions of Article IV of this Chapter for some definite period of time, and appoint therefor a Board of Health.

*Board of Health to be established in incorporated towns and cities. Duty of Board. Trustees may adopt Article III and IV.*

[Amendment to Section 3061, approved March 19, 1878.]

3061. It shall be the duty of the Board of Trustees, Council, or other corresponding Board, of every incorporated town and city of this State, to establish, by ordinance, a Board of Health for such town or city, to consist of five persons, one at least of whom shall be a practicing physician and a graduate of some reputable school of medicine, and one, if practicable, a civil engineer. The members of the Board shall hold their offices at the pleasure of the appointing power. Every local Board of Health established in this State must:

*First*—Supervise all matters pertaining to the sanitary condition of their town or city, and make such rules and regulations relative thereto as are necessary and proper, and not contrary to law.

*Second*—Report to the Secretary of the State Board of Health, at Sacramento, at such times as the State Board of Health may require:

*a.* The sanitary condition of their locality.

*b.* The number of deaths, with the cause of each, as near as can be ascertained within their jurisdiction, during the preceding month.

*c.* The presence of epidemic or other dangerous, contagious, or infectious disease, and such other matters, within their knowledge or jurisdiction, as the State Board may require.

The Trustees, Council, or other legislative Board, by whatever name known, of any incorporated city or town of this State may, by ordinance, adopt any portion of Article III and IV of this Chapter, or either of them, for some definite period of time, as may seem proper for the regulation of sanitary matters within their town or city.

SEC. 2. This Act shall not extend to any incorporated city or town, or city and county, for which health regulations are provided by special statutes.

As a guide for local Boards of Health in carrying out the provisions of the above bill, the following form of an ordinance was issued and, together with the accompanying circular, was sent to the authorities of each incorporated city and town in the State:

#### CIRCULAR OF THE STATE BOARD OF HEALTH.

SACRAMENTO, June 24, 1878.

*To the Honorable Board of Trustees of ——— :*

For the purpose of facilitating the work of the Boards of Health established in the cities and towns of California, under the provisions of the "Act to amend section three thousand and sixty-one of the Political Code, relative to local Boards of Health," approved March nineteenth, eighteen hundred and seventy-eight, the State Board of Health have prepared, and recommend to the Trustees of the different incorporated towns in which such Boards are about to be established, the following ordinances, or such sections thereof as may seem to be applicable to the local condition. These ordinances are intended simply as a guide, and are presented in conformity with the request of the health authorities of several localities. They are such as have been successfully used in some of the cities of this and other States.

Respectfully yours,

H. GIBBONS, M. D.,

President State Board of Health.

F. W. HATCH, M. D.,

Secretary State Board of Health.

#### ORDINANCE CREATING A BOARD OF HEALTH, AND DEFINING ITS POWERS.

*The Board of Trustees of the City of ———, do enact as follows:*

SECTION 1. ———, ———, ———, ———, ———, are hereby constituted a Board of Health for the City of ———, and shall hold office until the ———, or until their successors are elected.

and qualified; and on or before the ——— day of ———, and annually thereafter, the Board of Trustees shall choose five persons, one, at least, of whom shall be a practicing physician and a graduate of some reputable school of medicine, and one, where practicable, a civil engineer, who shall be a Board of Health, and hold office for one year, and until their successors are elected and qualified, and the President of the Board of Trustees shall be ex officio President of the Board of Health, but not entitled to vote except in cases of a tie, when he shall have the right to vote.

SEC. 2. The Board of Health shall have power to adopt such measures as will, in their judgment, best promote the health of the city and prevent the spread of disease; to enter into and examine, in the daytime, all vessels in port, buildings, lots, and places in the city; to prevent or forbid communication with infected families or houses, and, by and with the consent of the Trustees, to establish a pest-house or hospital, and provide the necessary supplies therefor, and generally to exercise a supervision over hospitals, prisons, school-houses, and public buildings, so far as in their judgment may be necessary for the promotion of health.

SEC. 3. It shall be the duty of the Board of Health to recommend to the Board of Trustees, in writing, whenever they shall deem necessary, such sanitary measures as they may consider advisable, and to coöperate with them in carrying the same into effect; and furthermore, they may employ, when deemed advisable, by and with the consent of the Trustees, a suitable person to act as Health Officer, who shall receive as compensation ——— dollars per month, when actually and necessarily employed in the performance of the duties prescribed by law.

#### DUTIES OF HEALTH OFFICER.

SECTION 1. It shall be the duty of the Health Officer, under the direction and control of the Board of Health, to enforce all laws, ordinances, and regulations relating to causes of sickness, nuisances, and sources of filth existing within said city.

SEC. 2. He may, under the direction of the Board of Health, remove any person who is not a resident of the city, and who is known to be infected with any dangerous, contagious, or infectious disease, to the pest-house, where such action shall be deemed necessary to prevent the spread of such disease, and when such removal can be made without danger to the life of such person.

SEC. 3. Whenever a nuisance endangering, in the opinion of the Health Officer, the public health, shall be ascertained to exist on any premises, or in any house, or other place, in said city, he shall, with the approval of the Board of Health, notify, in writing, any person or persons owning or having control of, or acting as agent for, such premises, house, or other place, to abate or remove such nuisance within a reasonable time, to be stated in such notice.

SEC. 4. Upon the neglect or refusal of any owner, occupant, or agent, or other person having control of such house, or other place within said city, to comply with such notice, the Health Officer may abate such nuisance, and the owner, agent, or occupant, or other person having control of such house or place, in addition to the penalty provided by this ordinance, shall be liable to said city for the cost of such abatement, to be recovered in a civil action in any Court of competent jurisdiction within said city.

SEC. 5. It shall be the duty of any member of said Board of Health, the Health Officer, or any public officer, when necessary to secure the public health, to enter upon the premises, or in the house, or other place of any person within the said city, to ascertain any nuisance that may there exist, to inspect drains, vaults, cellars, cesspools, water-closets, privies, or sewers, or the yards of such premises, to examine into their condition, and when satisfied that apartments used for lodgings or other purposes are improperly constructed, or liable from over crowding or filth to become dangerous to the public health, or to disseminate contagious or infectious disease, or are not properly provided with privies, water-closets, or with sewers, drains, or cesspools properly trapped, they or any of them shall serve a written notice upon the owner, or other person in charge of such premises, to remove the nuisance therein named, and if such owner or other person in charge neglect to obey such notice, said Board or officer may put the same in proper order at the expense of the owner or other person in charge thereof.

#### OF BIRTHS, DEATHS, AND INTERMENTS.

SECTION 1. Every person practicing midwifery under whose charge or superintendence any birth shall occur within the City of ———, shall fill up and deliver to the Secretary of the Board of Health, within forty-eight hours after said birth, a blank schedule to be furnished, on application, by said Secretary, containing the particulars of said birth as to sex, color, residence, and names of parents; and in case the birth of any child has occurred without the attendance of a practitioner of midwifery, or should no other person or nurse have been in attendance immediately thereafter, then it shall be the duty of the parents of such child to report its birth to said Secretary, within the manner and form above described; and the said Secretary shall keep a record of the certificates of birth so furnished in a book kept for that purpose, and shall report a transcript of the same quarterly to the Secretary of the State Board of Health.

SEC. 2. Every sexton, undertaker, or other person wishing to inter any human body, shall first obtain and file with the Superintendent of the City Cemetery a certificate of death as prepared by the Board of Health, signed by the attending physician, or, in his absence, by the President of the Board of Health, or by the Coroner, and it shall be the duty of said Superin-

tendent to examine such certificate, and, if satisfied of its correctness, and conformity with this section, then to issue a permit of burial of such person to the applicant; and in no case shall a permit of burial be granted otherwise, unless it is satisfactorily shown through the Superintendent of the City Cemetery, to one or more members of the Board of Health, that it is beyond the power of the applicant to comply with these requirements.

SEC. 3. Every undertaker, or other person or persons, before removing a dead body from the City of —, to any other place beyond the jurisdiction of the City Board of Health, shall first procure from the Health Officer, or any member of the Board of Health, a written permit granting such removal; and said permit shall in all cases be annexed to the certificate of death, as provided in section two of this ordinance.

SEC. 4. It shall be the duty of each physician in this city to report to the Health Officer, or to a member of the Board of Health, every patient he shall have laboring under Asiatic cholera, smallpox, or other dangerous, contagious, or infectious disease, as soon as he shall become satisfied of the nature of the disease, and to report to the same officer, or member of the Board of Health, every case of death from such disease immediately after it shall have occurred.

SEC. 5. It shall be the duty of every householder in this city to report, in writing, to the Health Officer, or to a member of the Board of Health, immediately, the name of every person boarding at his or her house, whom he or she shall have reason to believe to be sick with cholera, smallpox, or other dangerous, contagious, or infectious disease, and any deaths occurring at his or her house from such diseases.

SEC. 6. Whenever a case of smallpox or cholera shall exist in any house or tenement, and it shall be deemed inexpedient to remove the person or persons so affected to the proper hospital, it shall be the duty of the Health Officer to require all such persons to be kept closely confined in their respective dwellings or places of abode, and shall immediately cause to be erected in a conspicuous place in front of such dwelling or place of abode, a yellow flag, or other suitable notice, setting forth the fact; and it shall be unlawful for the occupants thereof, or any other person, to remove such flag or notice so long as in the opinion of the Health Officer, or Board of Health, the same ought to remain on the said premises.

SEC. 7. No person or persons, except the physician, clergyman, or undertaker, and those having a written permit from the Board of Health, or Health Officer, shall enter or depart from any house where smallpox or cholera exists, or while the corpse of any person who shall have died of such disease remains within the house, nor within ten days thereafter, or until said building and its contents shall have been disinfected or otherwise disposed of to the satisfaction of the Board of Health, or the Health Officer.

#### PRIVIES, WATER-CLOSETS, ETC.

SECTION 1. No privy vault, privy, cesspool, or water-closet, shall be allowed by the owner, or other person in charge of the premises upon which the same may be situated, to become foul or offensive, and when, in the opinion of the Board of Health, any such privy, vault, or closet, or cesspool, shall need cleaning or disinfecting, it shall be their duty to notify such owner, or other person having control, to abate the same, by disinfecting or cleaning, as in the judgment of the Board may be prudent.

SEC. 2. No butcher's offal or garbage, nor any dead animal, or any putrid or offensive animal or vegetable matter, shall be allowed to remain upon the premises of any person, or be deposited upon any street, alley, or vacant lot, or into any standing water or excavation.

SEC. 3. Any person who shall violate any of the provisions of the above ordinance shall be fined in any sum not exceeding fifty dollars, and the costs of prosecution.

*May appoint Health Officer in lieu of Board.*

3062. In the place of appointing a Board of Health, the Board of Supervisors, or the city or town authorities, may appoint a Health Officer, with all the duties and powers of the Board of Health and Health Officer, as specified in the two preceding Articles.

*Per capita or property tax, how levied.*

3063. All necessary expenses of enforcing this Article are charges against the counties, cities, or towns respectively, for the payment of which the county, city, or town may levy a per capita tax of not exceeding three dollars, or a property tax of not exceeding one fourth of one per cent yearly, until the same is paid.

## CHAPTER III.

## REGISTRY OF BIRTHS, MARRIAGES, AND DEATHS.

- SECTION 3074. Registry of marriages.  
 3075. Registry of births.  
 3076. Registry of deaths.  
 3077. Reports to Recorder.  
 3078. Same.  
 3079. Duties of Recorder.  
 3080. Report to Secretary of State Board of Health.  
 3081. Fees.  
 3082. Penalties.

*Registry of marriages.*

3074. All persons who perform the marriage ceremony must keep a registry of the time of each marriage so celebrated, the residence, the names in full, the place of birth, the age of each party, and whether either party has ever been before married.

*Registry of births.*

3075. All physicians and professional midwives must keep a registry of the time of each birth at which they assist professionally, the sex, race, and color of the child, and the names and residence of the parents.

*Registry of Deaths.*

3076. Physicians who attend deceased persons in their last sickness, clergymen who officiate at a funeral, Coroners who hold inquests, sextons and undertakers who bury deceased persons, must each keep a registry of the name, age, residence, and time of death of such person.

*Register of births and deaths to be filed with Recorder.*

3077. All persons registering marriages, births, or deaths, must quarterly file with the County Recorder a certified copy of their register. All such certificates must specify, as near as may be ascertained, the name in full, age, occupation, term of residence in the city or county, birthplace, condition, whether single or married, widow or widower, sex, race, color, last place of residence, and cause of death of all decedents.

*Same.*

3078. If at any birth no physician or midwife attends, the parents must make the report.

*Duties of Recorder.*

3079. The Recorder must keep separate registers, to be known as the "Register of Marriages," the "Register of Births," and the "Register of Deaths," in which the marriages, births, and deaths certified to him must be numbered in the order in which they are reported to him. There must be stated in each register, in separate columns, properly headed, the various facts contained in the certificates, and the name and official or clerical position of the person making the report. The Recorder must carefully examine each report and register the same marriage, birth, or death but once, although it may be reported by different persons.

*Report to Secretary of State Board of Health.*

3080. The County Recorder must, every three months, transmit to the Secretary of the State Board of Health, at Sacramento City, a certified abstract of the registers of births, marriages, and deaths, prepared in the manner prescribed in the instructions of the Secretary, and upon blanks to be furnished by him for that purpose.

*Fees.*

3081. County Recorders, in those counties where their compensation is by fees, shall be allowed by the Board of Supervisors a fee of not exceeding ten cents for each name reported, to be paid out of the General Fund of the county; and in those counties where their compensation is by a fixed salary, the duties in this chapter provided shall be performed without compensation other than such salary.

*Penalties.*

3082. Any person on whom a duty is imposed by this Chapter, who fails, neglects, or refuses to perform the same as herein required, is liable to a penalty of fifty dollars, to be recovered by the District Attorney of the proper county, for the use of the General Fund of such county.

*Printing and distribution of blank forms of register.*

3083. The Secretary of the State Board of Health must prepare blank forms of said registers for the State Printer, who must print as many copies as the said Secretary shall direct, and deliver the same to the Secretary of State, who shall forward the same, from time to time, and in such numbers as shall be directed by the Secretary first mentioned to the County Recorders of the several counties, who must carefully keep and distribute the same to the persons in the county who are required to keep the registers and make the reports provided in this chapter.

## CHAPTER IV.

### DISSECTION.

SECTION 3093. Physicians, etc., may obtain dead bodies.

3094. Sheriff, etc., to give dead bodies to physicians in certain cases; when dead bodies are not to be given.

3095. Physicians, etc., to have certificate from Medical Society, and to give bond before receiving dead bodies.

*Physicians, etc., may obtain dead bodies.*

3093. Any physician or surgeon of this State, or any medical student under the authority of any such physician or surgeon, may obtain, as hereinafter provided, and have in his possession human dead bodies, or the parts thereof, for the purposes of anatomical inquiry or instruction.

*Sheriffs, etc., to give dead bodies to physicians in certain cases. When dead bodies are not to be given.*

3094. Any Sheriff, Coroner, Keeper of a County Poorhouse, public Hospital, County Jail, or State Prison, or the Mayor or Board of Supervisors of the City of San Francisco, must surrender the dead bodies of such persons as are required to be buried at the public expense to

any physician or surgeon, to be by him used for the advancement of anatomical science, preference being always given to medical schools by law established in this State, for their use in the instruction of medical students. But if such deceased person during his last sickness requested to be buried, or if within twenty-four hours after his death some person claiming to be of kindred or a friend of the deceased requires the body to be buried, or if such deceased person was a stranger or traveler who suddenly died before making himself known, such dead body must be buried without dissection.

*Physicians, etc., to have certificate from Medical Society, and to give bond before receiving dead bodies.*

3095. Every physician or surgeon, before receiving a dead body, must give to the Board or officer surrendering the same to him a certificate from the Medical Society of the county in which he resides, or if there is none, from the Board of Supervisors of the same, that he is a fit person to receive such dead body. He must also give a bond with two sureties, that each body so by him received will be used only for the promotion of anatomical science, and that it will be used for such purpose within this State only, and so as in no event to outrage the public feeling.

## CHAPTER V.

### CEMETERIES AND SEPULTURE.

SECTION 3105. Title to cemetery grounds.

3106. What constitutes a cemetery.

3107. Cemeteries, how laid out and dedicated on public lands.

3108. Inhabitants of city, town, or village to own cemetery.

3109. Public cemeteries, under whose control.

3110. Who exercises jurisdiction and control over.

3111. Register must be kept.

*Title to cemetery grounds.*

3105. The title to lands used as a public cemetery or graveyard, situated in or near to any city, town, or village, and used by the inhabitants thereof continuously, without interruption, as a burial ground, for five years, is vested in the inhabitants of such city, town, or village, and the lands must not be used for any other purpose than a public cemetery.

*What constitutes a cemetery.*

3106. Six or more human bodies being buried at one place constitutes the place a cemetery.

*Cemeteries, how laid out and dedicated on public lands.*

3107. Incorporated cities or towns, and for unincorporated towns or villages, the Supervisors of the county may survey, lay out, and dedicate of the public lands situated in or near such city, town, or village, not exceeding five acres, for cemetery and burial purposes. The survey and description thereof, together with a certified copy of the order made constituting the same a cemetery, must be recorded in the Recorder's office of the county in which the same is located.



*Inhabitants of city, town, or village to own cemetery.*

3108. The inhabitants of any city, town, village, or neighborhood, may by subscription or otherwise purchase or receive by gift or donation, lands not exceeding five acres, to be used as a cemetery, the title thereof to be vested in such inhabitants, and when once dedicated to use for burial purposes, must thereafter be used for no other purpose.

*Public cemeteries, under whose control.*

3109. The public cemeteries of cities, towns, villages, or neighborhoods, must be inclosed and laid off into lots, and the general management, conduct, and regulation of interments, permits to inter, or remove interred bodies, the disposition of lots and keeping the same in order, is under the jurisdiction and control of the cities and towns owning the same, if incorporated; if not, then under the jurisdiction and control of the Board of Supervisors of the county in which they are situated.

*Who exercises jurisdiction and control over.*

3110. The Boards of Supervisors, City Trustees, or other corresponding authorities having jurisdiction and control of cemeteries, may make general rules and regulations therefor, and appoint sextons or other officers to enforce obedience to the same, with such other powers and duties regarding the cemetery as they may deem necessary.

*Register must be kept.*

3111. The authority having control of a public cemetery must require a register of name, age, birthplace, and date of death and burial of every body interred therein, to be kept by the sexton or other officer, open to public inspection.

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## AN ACT

*To amend section three hundred and seventy-four of the Penal Code.*

[Approved March 23, 1876.]

*The People of the State of California, represented in Senate and Assembly,  
do enact as follows :*

SECTION 1. Section three hundred and seventy-four of the Penal Code is hereby amended so as to read as follows :

*Depositing dead animals in streets, etc.*

374. Every person who puts the carcass of any dead animal, or the offal from any slaughter pen, corral, or butcher shop, into any river, creek, pond, reservoir, stream, street, alley, public highway, or road in common use, or who attempts to destroy the same by fire within one fourth of a mile of any city, town, or village, and every person who puts the carcass of any dead animal, or any offal of any kind, in or upon the borders of any stream, pond, lake, or reservoir from which water is drawn for the supply of the inhabitants of any

city, city and county, or any town in this State, so that the drainage from such carcass or offal may be taken up by or in such stream, pond, lake, or reservoir, or who allows the carcass of any dead animal, or any offal of any kind, to remain in or upon the borders of any such stream, pond, lake, or reservoir within the boundaries of any lands owned or occupied by him, or who keeps any horses, mules, cattle, swine, sheep, or live stock of any kind, penned, corraled, or housed on, over, or on the borders of any such stream, pond, lake, or reservoir, so that the waters thereof shall become polluted by reason thereof, is guilty of a misdemeanor, and upon conviction thereof shall be punished as prescribed in section three hundred and seventy-seven of this Code.

SEC. 2. This Act shall take effect and be in force from and after its passage.

## AN ACT

*To amend section three hundred and seventy-six of the Penal Code.*

[Approved March 9, 1878.]

*The People of the State of California, represented in Senate and Assembly, do enact as follows :*

SECTION 1. Section three hundred and seventy-six of said Code is amended so as to read as follows:

*Violation of quarantine laws by masters of vessels.*

376. Every master of a vessel subject to quarantine or visitation by the Quarantine Officer, arriving in the port of San Francisco, who refuses or omits:

1. To proceed with and anchor his vessel at the place assigned for quarantine at the time of his arrival; or,

2. To submit his vessel, cargo, and passengers to the examination of the quarantine officer, and to furnish all necessary information to enable that officer to determine to what length of quarantine and other regulations they ought, respectively, to be subject; or,

3. To remain with his vessel at the quarantine during the period assigned for her quarantine, and while at quarantine to comply with the regulations prescribed by law, and with such as any of the officers of health, by virtue of authority given them by law, shall prescribe in relation to his vessel, his cargo, himself, his passengers or crew;

Is punishable by imprisonment in the County Jail not exceeding one year, or by fine not exceeding two thousand dollars, or both.

SEC. 2. This Act shall take effect from and after its passage.

## AN ACT

*To establish a quarantine for the Bay and harbor of San Francisco, and sanitary laws for the City and County of San Francisco.*

[Approved April 4, 1870.]

*The People of the State of California, represented in Senate and Assembly, do enact as follows:*

*Quarantine grounds.*

SECTION 1. The quarantine grounds of the Bay and harbor of San Francisco shall be at the anchorage of Saucelito.

*Board of Health.*

SEC. 2. There shall be a Board of Health in and for the City and County of San Francisco, which Board shall consist of the Mayor of the city and county, and four physicians, in good standing, residing in the City and County of San Francisco, who shall be appointed by the Governor, and they shall determine by lot. One shall hold for one year, one for two years, one for three years, one for four years; and their successors shall be appointed, as herein provided, for the term of five years each.

*Meetings.*

SEC. 3. The Mayor of the City and County of San Francisco shall be ex officio President of the Board of Health. They shall meet monthly, and at such other times as the President may call them together, for the transaction of business. In the absence of the President, the Board shall elect a Chairman, who shall be clothed with the same powers as the President.

*Health Officer.*

SEC. 4. There shall be a Health Officer for the City and County and port of San Francisco. He shall be elected by the Board of Health, and shall continue in office during its pleasure. He shall be a graduate of some medical college in good standing, and shall reside within the city limits of San Francisco.

*Powers.*

SEC. 5. The Health Officer shall have power to perform all acts which quarantine officers are usually authorized to perform, and shall be the executive officer of the Board of Health.

*Officers to be appointed.*

SEC. 6. The Board of Health shall appoint a Deputy Health Officer, who shall be a physician in good standing; a Secretary, two Health Inspectors, one Market Inspector, and one Messenger, whose duties shall be defined by the Health Officer.

*Salaries; to be paid monthly.*

SEC. 7. The following rates of compensation shall be allowed to the officers of the Health Department: Health Officer, twenty-four hundred dollars per year; Deputy Health Officer, eighteen hundred

dollars per annum; Secretary, two thousand one hundred dollars per annum; two Health Inspectors, one thousand two hundred dollars per annum each; one Market Inspector, one thousand two hundred dollars per annum; and one Messenger, nine hundred dollars per annum. All the salaries provided to be paid under the provisions of this Act shall be paid monthly, in equal installments, out of the General Fund of said city and county, in the same manner as the salaries of the other officers of said city and county are paid; and it shall be the duty of the Auditor of said city and county to allow, and of the Treasurer to pay, said salaries, in the manner herein provided.

*Expenses.*

SEC. 8. The Health Officer, in addition to his salary, shall receive such sums for the necessary expenses of his office as the Board of Health may direct; and the Auditor is hereby directed to audit, and the Treasurer to pay, such sums out of the General Fund. And the Board of Supervisors shall provide proper offices for the Health Department.

*Powers of Board.*

SEC. 9. The Board of Health shall have general supervision of all matters appertaining to the sanitary condition of said city and county, including the City and County Hospital, the County Jail, Almshouse, Industrial School, and all public health institutions provided by the City and County of San Francisco. And full powers are hereby given to said Board to adopt such orders and regulations, and appoint or discharge such medical attendants and employés, as to them seems best to promote the public welfare, and not in contravention of any law: and they may appoint as many Health Inspectors as they may deem necessary, in time of epidemic.

*Infected vessels to be reported.*

SEC. 10. It shall be the duty of shipmasters bringing vessels into the harbor of San Francisco—and of masters, owners, or consignees having vessels in said harbor—which have on board any cases of smallpox, yellow fever, or Asiatic cholera, typhus, or ship fever, to immediately report the same, in writing, to the Health Officer, before landing any passengers, casting anchor, or coming to any wharf, or as soon thereafter as they or either of them shall become aware of the existence of either of these diseases on board of said vessel.

*Landing of passengers.*

SEC. 11. No Captain or other officer in command of any vessel sailing under a register, arriving at this port, nor any owner, consignee, agent, or other person having charge of such vessel or vessels, shall, under a penalty of not less than one hundred dollars nor more than one thousand dollars, land or permit to be landed any freight, passengers, or other persons, from said vessel or vessels, till he shall have reported to the Health Officer, presented his bill of health, and received a permit from that officer to land said freight, passengers, or other persons.

*Duty of pilots.*

SEC. 12. It shall be the duty of every pilot who shall conduct into the port of San Francisco any vessel subject to quarantine or to examination by the Health Officer :

*First*—To bring said vessel no nearer the town than is allowed by section fourteen of this Act.

*Second*—To prevent any person from leaving, and any communication being made with the vessel under his charge till the Health Officer shall have boarded her, and shall have given the necessary orders and directions.

*Third*—To be vigilant in preventing any violation of the quarantine laws, and to report, without delay, all such violations that come to his knowledge, to the Health Officer.

*Fourth*—To present the master of the vessel with a printed copy of the quarantine laws, unless he have one already. And in the event of being subject to quarantine by reason of infection, to place at the mast-head a small yellow flag.

*Refusal to comply with sanitary regulations.*

SEC. 13. Every master of a vessel, subject to quarantine or visitation by the Health Officer, arriving in the port of San Francisco, who shall refuse or neglect, either :

*First*—To proceed with and anchor his vessel at the place assigned for quarantine, when legally directed so to do ; or,

*Second*—To submit his vessel, cargo, and passengers to the Health Officer, and to furnish all necessary information to enable that officer to determine to what length of quarantine and other regulations they ought, respectively, to be subject, or neglect to report all cases of disease mentioned in this Act, and all cases of death occurring on his vessel, and to comply with all the sanitary regulations of said bay and harbor ;

Shall be guilty of a misdemeanor, and on conviction thereof shall be punished as provided for in section eleven of this Act.

*Vessels arriving from infected ports.*

SEC. 14. All vessels arriving off the port of San Francisco, from ports which have been legally declared infected ports, and all vessels arriving from ports where there shall be prevailing, at the time of their departure, any contagious, infectious, or pestilential diseases (especially smallpox, Asiatic cholera, typhus or ship fever), or vessels with decaying cargoes, or which have unusually foul or offensive holds, shall be subject to quarantine ; and it shall be the duty of the master, owner, pilot, or consignee, to report any and all such vessel or vessels to the Health Officer without delay. No such vessel shall cross a right line drawn from Meiggs Wharf to Alcatraz Island, till the Health Officer shall have boarded her and given the order required by law.

*Inspection of vessels.*

SEC. 15. It shall be the duty of the Health Officer to board every vessel subject to quarantine or visitation by him, immediately on her arrival (or as soon as he shall be notified thereof), between sunrise and sunset, to make such examination and inspection of vessel, books, papers, or cargo, or of persons on board, under oath, as he may judge expedient ; to determine whether said vessel should be ordered to quarantine, and if so, the period of quarantine.

*Landing passengers without permit.*

SEC. 16. No captain or other officer in command of any passenger-carrying vessel of more than one hundred and fifty tons burden, nor of any vessel of more than one hundred and fifty tons burden having passengers on board, nor any owner, consignee, agent, or other person having charge of such vessel or vessels, shall, under a penalty of not less than one hundred dollars nor more than one thousand dollars, land or permit to be landed any passenger or passengers from said vessel or vessels, until he shall have presented his bill of health to the Health Officer, and received a permit from that officer to land said passenger or passengers, except in such cases as the Health Officer shall deem it safe to give the permit before seeing the bill of health.

*Fees collectible.*

SEC. 17. The following fees shall be collected by the Health Officer: For giving a permit to land freight or passengers, or both, from any vessel of less than one thousand tons burden, from any port out of this State, two and a half dollars; from any port in this State, one dollar and a quarter; from any passenger-carrying vessel of more than one thousand tons burden, three dollars and seventy-five cents; from vessels of more than one thousand tons burden, carrying no passengers, two dollars and fifty cents; *provided*, that vessels carrying less than twenty passengers shall in no case pay more than two dollars and a half; but this shall not apply to sailing vessels sailing to and from any port of the Pacific States of the United States, or Territories, or to whaling vessels entering the harbor of San Francisco, excepting that they shall report to the Health Officer, as provided for in section ten of this Act.

*Vaccination.*

SEC. 18. The Health Officer, or his deputy, shall board any vessel bringing passengers from Asiatic ports, and coming into the harbor of San Francisco, and then and there, in his discretion, vaccinate each and every one of said passengers before they shall be permitted to land in the City and County of San Francisco.

*Revaccinate.*

SEC. 19. In case there shall be any persons on board the vessels mentioned in section ten, who shall actually be sick with the small-pox, the Health Officer is hereby authorized to require each and every person on board said vessel to be revaccinated, if he or she has been previously vaccinated, or to be then and there vaccinated for the first time.

*Master of vessel to aid Health Officer.*

SEC. 20. It shall be the duty of each and every master, or other officer having command of such vessel, to aid the Health Officer in performing the duties herein required, by anchoring his vessel in the bay, and by all other suitable and reasonable means, until said vaccination shall have been completed; and any master or other officer in command of such vessel, who shall neglect or refuse to render such assistance in carrying out the provisions of this section, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine not less than one hundred dollars nor more than five hundred dollars.

*Fee for vaccinating.*

SEC. 21. The fees of the Health Officer for vaccinating such passengers, shall be one dollar for each and every person so vaccinated; and all persons refusing to be vaccinated or to pay the fee therefor, shall be detained at quarantine on board said vessel until they are vaccinated and pay the fee therefor, and he is hereby authorized to collect the said fee from the person or persons vaccinated.

*Hospitals.*

SEC. 22. The Board of Health shall have power, under the provisions of this Act, to provide suitable hospitals, to be situated at or near Saucelito, and furnish and supply the same with suitable nurses and attachés, as in their judgment the public health may require, and to remove thereto all persons afflicted with cholera, yellow fever, typhus or ship fever.

*Record of births, etc.*

SEC. 23. It shall be the duty of the Health Officer to keep a record of all births, deaths, and interments occurring in the City and County of San Francisco, in books duly prepared for that purpose. Said records, when filled, shall be deposited in the office of the County Recorder, and produced when required for public inspection.

*Interments without certificate.*

SEC. 24. Every sexton, undertaker, superintendent of a cemetery, or other person, who shall inter or cause to be interred any human body without having first obtained and filed with the Health Officer a physician's certificate, or the Coroner's certificate, setting forth, as nearly as possible, the name, age, color, sex, and date and place of birth, date and locality of death, and cause of death of the deceased, shall be deemed guilty of misdemeanor, and on conviction shall be punished as provided in section twenty-nine of this Act.

*Physician's certificate.*

SEC. 25. It shall be the duty of the physicians, when deaths occur in their practice, to give a certificate to that effect, with the name, age, color, nativity, date of death, place of death, and occupation of deceased. For this purpose blank certificates shall be kept at the Health Office.

*Monthly returns of births, etc.*

SEC. 26. Physicians and midwives shall, on or before the fourth day of each month, make a return to the Health Officer of all births, deaths, and the number of still-born children, occurring in their practice during the preceding month. In the absence of such attendants, it shall be the duty of the parent to make such report within thirty days after the birth of said child.

*Returns of permits for interment.*

SEC. 27. Superintendents of cemeteries within the boundaries of the City and County of San Francisco shall make returns to the Health Officer, on each Monday, of all permits for interment received by them during the preceding week.

*Removal of bodies.*

SEC. 28. No Superintendent of a cemetery shall remove or cause to be removed, disinter or cause to be disinterred, any corpse that shall have been deposited in said cemetery, without a permit from the Health Officer or by order of the Coroner.

*Neglect to comply with this Act.*

SEC. 29. Any person who shall neglect or refuse to comply with any of the provisions of this Act, shall be deemed guilty of misdemeanor, and on conviction thereof, shall be punished by a fine of not less than one hundred dollars nor more than one thousand dollars, or by imprisonment in the County Jail not exceeding twelve months, or by both such fine and imprisonment.

*Nuisances.*

SEC. 30. Whenever a nuisance shall exist on property of any non-resident of the city and county, the Board of Supervisors may, on the recommendation of the Board of Health, cause such nuisance to be abated, and may allow and order paid, out of the General Fund, all proper charges and expenses incurred in abating such nuisance; and all sums so allowed and paid shall become a charge upon the property on which the nuisance existed, and may be recovered by an action against such property, and by a sale of the property on execution for such judgment, the same as in other cases.

*To have jurisdiction.*

SEC. 31. The Police Judge's Court of the City and County of San Francisco shall have full and complete jurisdiction of all actions and proceedings for the violation of the provisions of this Act.

*Fee book.*

SEC. 32. It shall be the duty of the Health Officer to have kept in his office a book, in which shall be entered all fees collected by him; and he shall cause the same to be paid over to the City and County Treasurer weekly, under oath, to the credit of the General Fund.

*Bonds.*

SEC. 33. The Health Officer, before entering on his duties, shall give bonds with good and sufficient sureties, to be approved by the Board of Health, in the sum of ten thousand dollars, for the faithful performance of his duties.

*Oaths.*

SEC. 34. Any member of the Board of Health, Deputy Health Officer, or Secretary of the Health Department, shall be empowered to administer oaths on business connected with that department.

SEC. 35. All Acts or parts of Acts in conflict with this Act or any of its provisions are hereby repealed.

SEC. 36. This Act shall take effect immediately after its passage.



## AN ACT

*Amendatory of and supplementary to an Act entitled "An Act to establish a quarantine for the Bay and harbor, and sanitary laws for the City and County of San Francisco," approved April fourth, eighteen hundred and seventy.*

[Approved March 16, 1876.]

*The People of the State of California, represented in Senate and Assembly, do enact as follows :*

*Quarantine officer. Bond.*

SECTION 1. From and after the passage of this Act the Deputy Health Officer of the City and County of San Francisco shall be known as the Quarantine Officer. He shall have power to perform all acts which he has heretofore performed under the title of Deputy Health Officer, and all acts which quarantine officers are usually authorized to perform. He shall give bonds, with good and sufficient security, to be approved by the Board of Health, in the sum of five thousand dollars.

*Health Inspectors, salaries of.*

SEC. 2. There shall be four Health Inspectors for the City and County of San Francisco, who shall be appointed by the Board of Health, and shall receive twelve hundred dollars per annum each, to be paid in the same manner as is provided for the payment of the salaries of the other appointees of the Board of Health.

*Removal of nuisances, appropriations for.*

SEC. 3. Section thirty of said Act is amended to read as follows :

Section 30. Whenever a nuisance shall exist on the property of any non-resident, or any property the owner or owners of which cannot be found by either Health Inspector, after diligent search, it shall be the duty of the Board of Health to cause the said nuisance to be at once removed, and to draw upon the General Fund for such sums as may be required for its removal, not to exceed two hundred dollars; *provided*, that whenever a larger expenditure is found necessary to be made for the removal or suppression of any nuisance, the Board of Supervisors of said city and county may, upon the written application of the Board of Health, by ordinance, appropriate, allow, and order paid out of the General Fund such sum or sums as may be necessary for that purpose; *provided further*, that in all cases where such expenditure will exceed five hundred dollars, no appropriation shall be made for that purpose, unless the City and County Attorney shall first give his opinion, in writing, that such expenditure would be a legal charge against the property affected thereby. The Auditor shall audit and the Treasurer shall pay all appropriations of money made in pursuance of this section, in the same manner as is now provided by law for auditing and paying demands upon the treasury.

*Transportation of deceased persons.*

SEC. 4. No person, master, captain, or conductor, in charge of any boat, vessel, railroad car, or public or private conveyance, shall receive for transportation, or shall transport, the body of any person

who has died within the limits of the City and County of San Francisco, without obtaining a permit for the same from the Health Officer, which permit must accompany the body to its destination; and no person, master, captain, or conductor, as aforesaid, shall bring into or transport through the said city and county, the dead body of any person, unless it be accompanied with a certificate from some proper authority of the place whence it came, stating name, age, sex, and cause of death, which certificate shall be filed at the Health Office; *provided*, that in no case shall the body of any person who died of a contagious disease be brought to the city within one year of the date of death.

*Notice of birth to be given. Misdemeanor.*

SEC. 5. Section twenty-six of said Act is amended to read as follows:

Section 26. It shall be the duty of the parent or parents, or, in the case of their death, then of the next of kin in attendance, or, if there be no relative in attendance, then of the person having charge or control of any child born within the limits of the City and County of San Francisco, to report the same to the Health Officer within ten days of its birth, giving name (if named), date of birth, sex, color, name, birthplace, and occupation of father, maiden name and birthplace of mother, and place of birth. Blanks for this purpose shall be kept at the Health Office. All persons failing to comply with the provisions of this section shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be punished by fine of not less than five dollars nor more than fifty dollars.

SEC. 6. All Acts and parts of Acts in conflict with the provisions of this Act are hereby repealed.

SEC. 7. This Act shall take effect from and after its passage.

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NOTE.—The Act of April fourth, eighteen hundred and seventy, and the Act amending it, approved March sixteenth, eighteen hundred and seventy-six, given above, contain provisions similar to the sections of the Political Code upon the same subject, viz.: Sections 3004 to 3032 inclusive. The Political Code was enacted into a law in eighteen hundred and seventy-two, and went into effect January first, eighteen hundred and seventy-three. Section 18 of the Political Code is as follows:

“No statute, law, or rule is continued in force because it is consistent with the provisions of this Code on the same subject, but in all cases provided for by this Code, all statutes, laws, and rules heretofore in force in this State, whether consistent or not with the provisions of this Code, unless expressly continued in force by it, are repealed and abrogated.”

The local health Acts for San Francisco were not expressly continued in force by the Codes. Under that section it would seem that the Act of April fourth, eighteen hundred and seventy, “to establish a quarantine for the Bay and harbor, and sanitary laws for the City and County of San Francisco,” was repealed when the Codes took effect, and that the amendatory Act of March sixteenth, eighteen hundred and seventy-six, purporting to amend an Act which had been repealed, fell to the ground. In passing the amendatory Act of eighteen hundred and seventy-six the Legislature must have assumed that the Act of eighteen hundred and seventy was still in force. The provisions of the Political Code, and also the local Acts referred to, are given above; the question as to which law takes precedence of the other not being here decided.

# NAMES AND RESIDENCES

*Of Correspondents of the State Board of Health, for the year ending June 30, 1880.*

NAMES.	RESIDENCES.
Bates, C. B., M.D.	Santa Barbara, Santa Barbara County.
Briceland, J. M., M.D.	Shasta, Shasta County.
Baylor, W. C., M.D.	Willows, Colusa County.
Bell, W. T., M.D.	Winters, Yolo County.
Christie, J. H., M.D.	Petaluma, Sonoma County.
Crowder, H. C., M.D.	Williams, Colusa County.
Caldwell, A. B., M.D.	Marysville, Yuba County.
Crumpton, H. J., M.D.	Lakeport, Lake County.
Davis, G. W., M.D.	Chico, Butte County.
Dawson, W. J. G., M.D.	St. Helena, Napa County.
Delmont, F., M.D.	San Buenaventura, Ventura County.
Durant, F. C., M.D.	Folsom, Sacramento County.
Finlaw, W., M.D.	Santa Rosa, Sonoma County.
Fox, W. R., M.D.	San Bernardino, San Bernardino County.
Frost, James, M.D.	Vallejo, Solano County.
Hall, A. E., M.D.	Visalia, Tulare County.
Jump, Alembly, M.D.	Downieville, Sierra County.
Kirkpatrick, C. A., M.D.	Redwood City, San Mateo County.
Kunkler, E. A., M.D.	Placerville, El Dorado County.
Lindsley, Walter, M.D.	Los Angeles, Los Angeles County.
Mason, C. C., M.D.	Chico, Butte County.
McCornack, H. F., M.D.	St. Helena, Napa County.
Meares, J. L., M.D.	San Francisco, San Francisco County.
Orme, H. S., M.D.	Los Angeles, Los Angeles County.
Parkison, M. C., M.D.	Antioch, Contra Costa County.
Pedlar, A. J., M.D.	Fresno, Fresno County.
Pyburn, G., M.D.	Sacramento, Sacramento County.
Reins, J. W., M.D.	Crescent City, Del Norte County.
Rickey, Addison, M.D.	Williams, Colusa County.
Ross, Thomas, M.D.	Woodland, Yolo County.
Rucker, H. N., M.D.	Merced, Merced County.
Stockton, T. C., M.D.	San Diego, San Diego County.
Thorworth, J. F., M.D.	South River, Del Norte County.
Tooley, L. P., M.D.	Willows, Colusa County.
Winston, J. B., M.D.	Los Angeles, Los Angeles County.
Wells, G. M., M.D.	Sonoma, Sonoma County.
Westlake, G. W., M.D.	Red Bluff, Tehama County.
Wilhite, W. J., M.D.	Modesto, Stanislaus County.
Young, B. S., M.D.	Santa Rosa, Sonoma County.

The Secretary is authorized by the State Board of Health to express their grateful acknowledgments to the medical gentlemen who have kindly volunteered to make monthly reports to the Board, and whose contributions have aided in the preparation of this report.

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REPORT

OF THE

REGENTS OF THE UNIVERSITY

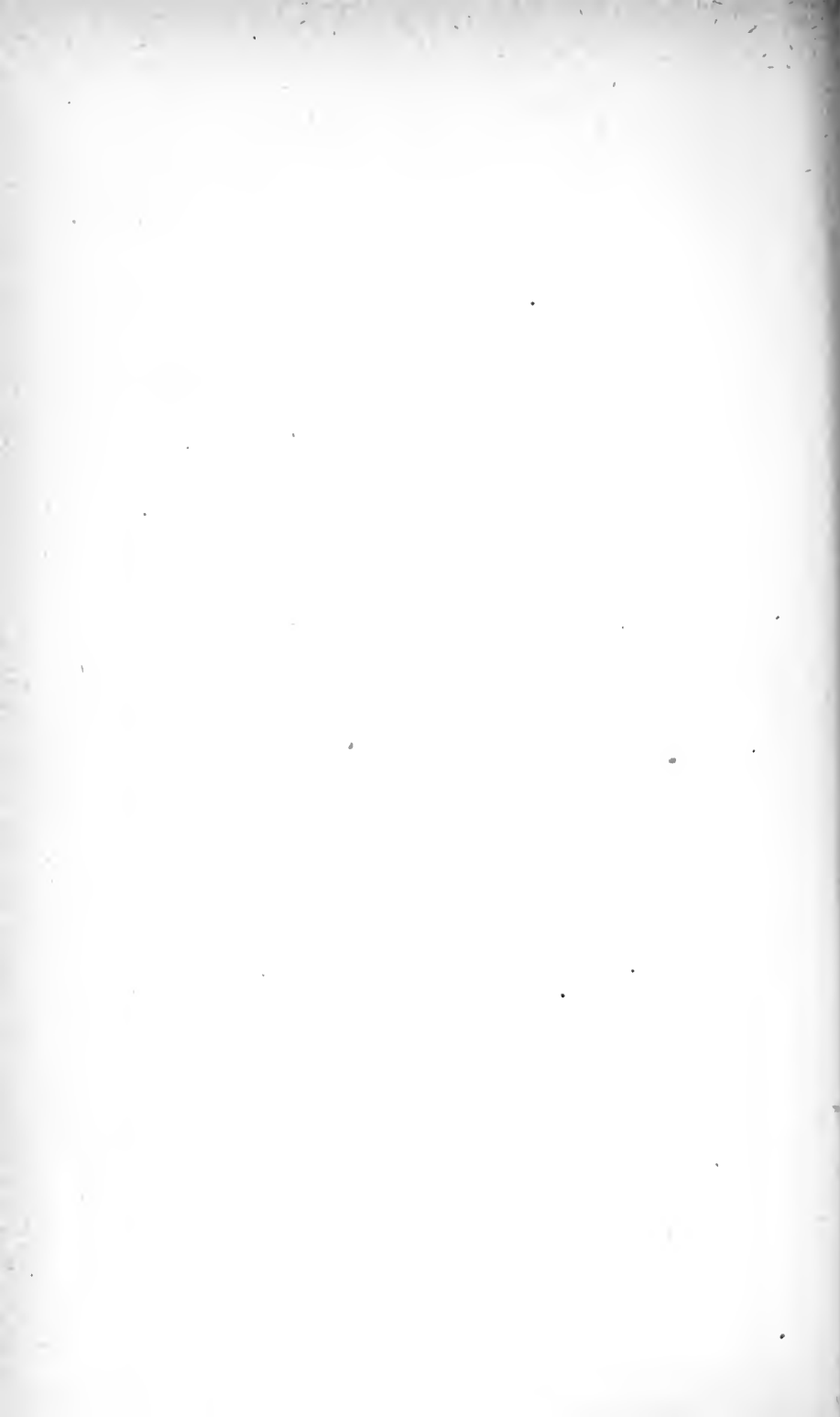
OF

CALIFORNIA,

FOR THE YEAR ENDING JUNE 30, 1880.

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# REPORT.

UNIVERSITY OF CALIFORNIA, }  
BERKELEY, August 1, 1880. }

*To his Excellency* GEORGE C. PERKINS, *Governor of California:*

DEAR SIR: In pursuance of the instructions of the Board of Regents, I herewith transmit to you the report of the Board of Regents of the University of California for the year ending June 30, 1880.

With respect, very truly yours,

ROBERT E. C. STEARNS,  
Secretary of the Board of Regents.

# REPORT.

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*To the Honorable the Board of Regents of the University of California:*

GENTLEMEN: In conformity with the requirements of Section 1432, paragraph 17, of the Political Code of California, I herewith present my report for the term included between the 30th day of June, 1879, and the 30th day of June, 1880.

JOHN LECONTE, President.

UNIVERSITY OF CALIFORNIA, BERKELEY, August 1, 1880.

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## COLLEGES IN THE UNIVERSITY.

The University embraces eight courses of study, commonly called "Colleges," namely:

In Science: Agriculture, Mechanics, Engineering, Chemistry, and Mining.

In Letters: Classical, and Literary.

Professional: Medicine, and Law. (1).

For the Colleges in Science, as well as for the literary course in the College of Letters, the degree given at the close of the course is that of Bachelor of Philosophy. For the Classical Course, the degree is that of Bachelor of Arts; in the Medical College, the degree is Doctor of Medicine.

The Scientific Courses correspond very closely with the modern courses established in the institutions of other States which received the congressional grant of eighteen hundred and sixty-two. They are intended to give the student a good preparation for the pursuits of Agriculture, Mining, Engineering, Mechanics, and Chemistry. The studies of the first two years are very nearly the same in all these Colleges. In the last two years the special studies predominate.

The Literary Course is based upon History and the general scientific studies, including Mathematics, Physics, Chemistry, Geology, etc.; Modern Languages, including Anglo-Saxon, English, French, and German, with the option of others.

The Classical Course corresponds closely with that of Classical Colleges at the East.

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(1) The College of Medicine is in San Francisco; it is under a separate Faculty, and is self-supporting. The College of Law is also in San Francisco, and has a separate endowment.

The California College of Pharmacy has been affiliated with the University, retaining its own organization. Neither of these Colleges receive any part of the State appropriations.

## CLASSES OF STUDENTS.

The students at Berkeley are not only enrolled in separate Colleges, but in each College they may enter in regular or special courses. The regular courses are strongly recommended, instead of special courses, to those who want a thorough and systematic education. The special courses are adapted to those who desire to acquire proficiency in a single branch, or who are unable to remain long enough to pursue a full course.

*Special Course Students.*—Those are thus designated who take up but one or two lines of study, and they are not required to pass the general examinations for admission. They need only to satisfy the instructors in their specialties that they are qualified to profit by the exercises of the class. The permission is accorded only to those who have already made a considerable proficiency in knowledge. Access may thus be obtained to some scientific course, to the chemical laboratory, to instruction in some modern language, etc.

*Students at Large.*—Students who give all their time to special studies are designated as Students at Large. They are subject to all the regulations of the University, and are expected to make up for themselves a full schedule of study, approved by the Faculty. They will be required to pass the same entrance examination as candidates for the Colleges of Science, and may, by vote of the Faculty, be admitted as candidates for degrees.

*Optional Studies.*—Students already proficient in the studies laid down in the general scheme which they are following, or who have extra time at their disposal, may pursue optional studies, with the permission of the Faculty; or they may attend lectures and exercises appointed for other sections of the University, if it does not conflict with their regular appointments.

NOTE.—Regular students who may fail to maintain their standing in one of the four classes will not be permitted, except in extraordinary cases, to take the position of Special Students.

## EXAMINATIONS.

In all the courses of the University, the instruction, whether by lectures or text-books, is accompanied by daily examinations.

Term examinations are held at the close of the first term, on the studies of the term. These examinations are either in writing or oral, according to the nature of the study.

Annual examinations are held at the close of each academic year. They cover the ground gone over during the year, and the four thus held constitute the examination for a degree. These examinations are chiefly in writing.

## EXAMINATIONS FOR DEGREES.

For students passing through the University, these examinations are annual, as stated above, and there is no other examination covering the whole course. But the law provides such a general examination for those who have studied elsewhere:

Students who shall have passed not less than a full year as resident students in any college, academy, or school in this State, and, after examination by the respective Faculty of such college, academy, or school, are recommended by such Faculty as proficient candidates for any degree in any regular course of the University, shall be entitled to be examined therefor at the annual examination; and on passing such examination shall receive such degree for that course,



and the diploma of the University therefor, and shall rank and be considered in all respects as graduates of the University.

All students of the University who have been resident students thereof for not less than one year, and all graduates of the University in any course, may present themselves for examination in any other course or courses, at the annual examinations, and, on passing such examination, shall receive the degree and diploma of that course.

#### GRADUATION THESES.

As a part of the final examination for degrees, every candidate in the College of Letters is required to prepare a thesis upon a subject to which he has given special attention. In the Colleges of Science problems will be assigned by the instructor in charge, or the student may, with the consent of the instructor, work problems or pursue investigations of his own choosing.

Subjects for theses must be chosen by the beginning of the second term of Senior Year, and the theses presented in complete form at least six weeks before Commencement. Portions of theses or work upon problems adjudged the best will be publicly read, in the presence of the Faculty and class, upon appointed days. The object of this requirement is to encourage special original investigations upon important themes growing out of or suggested by the several courses of study pursued in the University, and to afford a good opportunity for stating, in a clear and definite style, the result of such researches.

# REGENTS.

## EX OFFICIO REGENTS.

HIS EXCELLENCY, GEORGE C. PERKINS.....	SACRAMENTO.
<i>Governor, ex officio President of the Board.</i>	
HIS HONOR, JOHN MANSFIELD.....	LOS ANGELES.
<i>Lieutenant-Governor.</i>	
HON. J. F. COWDERY.....	SAN FRANCISCO.
<i>Speaker of the Assembly.</i>	
HON. FREDERICK M. CAMPBELL.....	OAKLAND.
<i>State Superintendent of Public Instruction.</i>	
HON. H. M. LARUE.....	SACRAMENTO.
<i>President of the State Agricultural Society.</i>	
P. B. CORNWALL, Esq.....	SAN FRANCISCO.
<i>President of the Mechanics' Institute.</i>	
PROF. JOHN LeCONTE.....	BERKELEY.
<i>President of the University.</i>	

## APPOINTED REGENTS:

REV. H. STEBBINS, D. D.....	SAN FRANCISCO.
HON. J. WEST MARTIN.....	OAKLAND.
HON. J. F. SWIFT.....	SAN FRANCISCO.
HON. SAMUEL B. McKEE.....	OAKLAND.
HON. JOSEPH W. WINANS.....	SAN FRANCISCO.
J. MORA MOSS, Esq.....	OAKLAND.
JOHN L. BEARD, Esq.....	MISSION OF SAN JOSÉ.
D. O. MILLS, Esq.....	MILBRAE.
A. S. HALLIDIE, Esq.....	SAN FRANCISCO.
HON. WILLIAM T. WALLACE.....	SAN FRANCISCO.
HON. JOHN BIDWELL.....	CHICO.
HON. JOHN S. HAGER.....	SAN FRANCISCO.
HON. A. L. RHODES.....	SAN JOSÉ.
PROF. GEORGE DAVIDSON.....	SAN FRANCISCO.
PROF. WILLIAM ASHBURNER.....	SAN FRANCISCO.
HON. B. B. REDDING.....	SAN FRANCISCO.

## EXECUTIVE OFFICERS.

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*President of the Board of Regents,*  
GOVERNOR GEORGE C. PERKINS.

*President of the University,*  
PROFESSOR JOHN LECONTE.

*Dean of the Academic Senate,*  
MARTIN KELLOGG.

*Committee on Instruction and Visitation,*  
REGENTS STEBBINS, DAVIDSON, REDDING, CAMPBELL, AND ASHBURNER.

*Committee on Endowment, Finance and Audit,*  
REGENTS HALLIDIE, MILLS, AND MOSS.

*Committee on Buildings, Grounds, and other Property,*  
REGENTS MOSS, MARTIN, AND DAVIDSON.

*Committee on Law,*  
REGENTS WALLACE, MCKEE, AND RHODES.

*Committee on Congressional Land Grant,*  
REGENTS WINANS, REDDING, AND BEARD.

*Committee on the Library and Museum,*  
REGENTS STEBBINS, ASHBURNER, AND WINANS.

*Treasurer,*  
D. O. MILLS.

*Secretary and Superintendent of the Grounds,*  
ROBERT E. C. STEARNS.

*Land Agent and Assistant Secretary,*  
J. HAM. HARRIS.

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## FACULTIES OF THE COLLEGES OF SCIENCE AND OF LETTERS.

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JOHN LECONTE, M. D., LL. D.,  
*President, and Professor of Physics.*

WILLIAM ASHBURNER,  
*Honorary Professor of Mining.*

GEO. WOODBURY BUNNELL, A. M.,  
*Professor of the Greek Language and Literature.*

GEORGE DAVIDSON, A. M.,  
*Honorary Professor of Geodesy and Astronomy.*

STEPHEN J. FIELD, LL. D.,  
*Honorary Professor of Law.*

FREDERICK G. HESSE,  
*Professor of Industrial Mechanics.*

EUGENE W. HILGARD, PH. D.,  
*Professor of Agriculture, Agricultural Chemistry, General and Economic Botany.*

MARTIN KELLOGG, A. M.,  
*Dean, and Professor of the Latin Language and Literature.*

JOSEPH LeCONTE, M. D., LL. D.,  
*Professor of Geology and Natural History.*

BERNARD MOSES, PH. D.,  
*Professor of History and Political Economy.*

WILLARD B. RISING, PH. D.,  
*Professor of Chemistry.*

EDWARD R. SILL, A. M.,  
*Professor of the English Language and Literature.*

FRANK SOULÉ, JR.,  
 (United States Military Academy,)  
*Professor of Civil Engineering and Astronomy.*

WILLIAM T. WELCKER,  
 (United States Military Academy,)  
*Professor of Mathematics.*

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*Professor of Oriental Languages and Literature.*

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*Professor of Moral and Intellectual Philosophy.*

ROSS E. BROWNE,  
*Instructor in Mechanical and other branches of Instrumental Drawing.*

SAMUEL B. CHRISTY, PH. B.,  
*Instructor in Mining and Metallurgy.*

JOHN B. CLARKE, PH. B.,  
*Instructor in Mathematics.*

CHARLES H. DWINELLE, PH. B.,  
*Lecturer on Practical Agriculture.*

GEORGE C. EDWARDS, PH. B.,  
*Instructor in Mathematics, and Colonel Commanding Battalion University Cadets.*

CARLOS F. GOMPERTZ,  
*Instructor in Spanish.*

A. WENDELL JACKSON, JR., PH. B.,  
*Instructor in Mineralogy.*

HENRY B. JONES,  
*Assistant Instructor in French and German.*

WM. CAREY JONES, A. M.,  
*Recorder of the Faculty, and Instructor in Latin.*

EDMUND C. O'NEILL, PH. B.,  
*Instructor in Chemistry.*

EDWARD A. PARKER, PH. B.,  
*Instructor in Physics and Mechanics.*

JAMES M. PHILLIPS, A. B.,  
*Instructor in Hebrew, Chaldaic, and Syriac.*

ALBIN PUTZKER,  
*Instructor in German.*

JOSEPH C. ROWELL, A. B.,  
*Librarian.*

JOSIAH ROYCE, JR., PH. D., BALD.,  
*Instructor in the English Language and Literature.*

E. H. SEARS, A. B.,  
*Instructor in Latin and Greek.*

F. SLATE, JR.,  
*Superintendent of Physical Laboratory.*

JOHN M. STILLMAN, PH. B.,  
*Instructor in Chemistry.*

GEORGE B. WILLCUTT, PH. B.,  
*Instructor in Chemistry.*

AUGUST HARDING,  
*Assistant in Chemistry.*

MEYER E. JAFFA, PH. B.,  
*Assistant in Agricultural Chemistry.*

JOHN ELLIS,  
*Gardener.*

J. J. RIVERS,  
*Curator of Museum.*

ABEL WHITTON,  
*Manager University Press.*

JAMES CHAMBERS,  
*Armorer and Engineer of Heating Apparatus.*

JANITORS:

GEORGE GLEASON,  
*North Hall.*

JOHN HART,  
*South Hall.*

E. P. CARPENTER,  
*Mechanic Arts College.*

E. A. SAWYER,  
*Gymnasium.*

## STUDENTS.

## FIRST, OR SENIOR CLASS.

Name.	Course.	Residence.
Frank L. Adams	Classical	Oakland.
Adah Bragg	Chemistry	San Francisco.
Russell W. Clarke	Mechanics	Berkeley.
Charles M. Coon	Mechanics	Menlo Park.
George M. Cumming	Mechanics	San Francisco.
Leonard C. Fisher	Agriculture	Oakland.
William W. Gill	Agriculture	Oakland.
Horace G. Kelsey	Agriculture	Merced Falls.
Douglas Lindley	Mining	Sacramento.
Max Loewenthal	Classical	Sacramento.
Seth Mann	Classical	San Francisco.
Reuben W. Mastick	Chemistry	Alameda.
James J. McGillivray	Classical	Oakland.
Robert Moore	Mechanics	San Francisco.
Hiram A. Pearsons	Mechanics	San Francisco.
Alice E. Pratt	Literary	St. Helena.
Harry Russell	Mining	Sacramento.
Kate O. Sessions	Chemistry	East Oakland.
Charles Shainwald	Literary	San Francisco.
Joseph A. Shaw	Engineering	Ferndale.
Total		20.

## SECOND, OR JUNIOR CLASS.

Name.	Course.	Residence.
James Akerly	Chemistry	Oakland.
William D. Armes	Literary	Oakland.
Benjamin Armington	Classical	Stockton.
Albert M. Armstrong	Literary	San Francisco.
John W. Atkinson	Chemistry	Oakland.
David Barcroft	Engineering	Hornitos.
Lizzie Barrett	Literary	Merced Falls.
Jennie Barry	Literary	Watsonville.
Rufus A. Berry	Mining	Wheatland.
Bernard Bienenfeld	Engineering	San Francisco.
John S. Bishop	Literary	Honolulu, H. I.
P. E. Bowles	Mining	San Francisco.
Diademus S. Dorn	Literary	Watsonville.
John J. Dwyer	Classical	San Francisco.
Annie C. Edmonds	Literary	San Francisco.
Harry M. Edmonds	Classical	San Francisco.
Charles A. Edwards	Literary	Santa Barbara.
Selim M. Franklin	Literary	San Bernardino.
Charles E. Hayes	Mining	Oakland.
Katie H. Hittell	Classical	San Francisco.
Kate Hodgkinson	Literary	Carson, Nevada.
Robert Hooker	Scientific	San Francisco.
Robert D. Jackson	Mining	East Oakland.
Oscar W. Jasper	Agriculture	Wheatland.
Samuel Levy	Engineering	San Francisco.
Jerome B. Lincoln	Classical	San Francisco.
William W. Nelson	Scientific	Woodland.
Addison P. Niles	Mechanics	San Francisco.
Charles H. Oatman	Literary	Sacramento.
Cutler Paige	Agriculture	San Francisco.

## SECOND, OR JUNIOR CLASS—Continued.

Name.	Course.	Residence.
Albert Painter.....	Literary.....	San Francisco.
Alexander F. Pollock.....	Scientific.....	San Francisco.
Norman A. Rideout.....	Literary.....	Marysville.
Niles Searls, Jr.....	Mechanics.....	Nevada City.
Eva Stoddart.....	Scientific.....	San Francisco.
Caroline J. Swney.....	Classical.....	Alameda.
Howard L. Weed.....	Engineering.....	Grass Valley.
George F. Whitworth, Jr.....	Literary.....	San Francisco.
Total.....		38.

## THIRD, OR SOPHOMORE CLASS.

Name.	Course.	Residence.
Florence Bartling.....	Classical.....	Oakland.
Flora E. Beal.....	Literary.....	San José.
Frances Bracken.....	Literary.....	Oakland.
William Bradford, Jr.....	Mechanics.....	Napa.
George B. Barstow.....	Literary.....	Santa Barbara.
Fred. L. Burk.....	Literary.....	Berkeley.
Armor Carnell.....	Classical.....	Berkeley.
Will E. Conner.....	Classical.....	San Francisco.
Walter B. Cope.....	Classical.....	Oakland.
William W. Deamer.....	Classical.....	Grass Valley.
Guy C. Earl.....	Classical.....	Oakland.
Sarah H. Ellery.....	Literary.....	Alameda.
William C. Fife.....	Engineering.....	Oakland.
Robert M. Fitzgerald.....	Literary.....	Berkeley.
Eddie Frick.....	Literary.....	Lewiston.
Marcus W. Fredrick.....	Classical.....	San Francisco.
Samuel E. Goodall.....	Mechanics.....	San Francisco.
Theodore Grady.....	Literary.....	Berkeley.
Edward N. Harmon.....	Classical.....	San Francisco.
John H. Hansen.....	Literary.....	Mount Eden.
John W. Havens.....	Engineering.....	Berkeley.
Brewton A. Hayne.....	Classical.....	Santa Barbara.
James P. Hays.....	Scientific.....	Pacheco.
Lottie M. Hollister.....	Literary.....	Oakland.
Charles J. Hittell.....	Literary.....	San Francisco.
Leroy B. Johnson.....	Engineering.....	Nevada City.
Isaac Joseph.....	Scientific.....	Sacramento.
Arthur L. Kelsey.....	Agriculture.....	Merced Falls.
William G. Lanigan.....	Classical.....	San Francisco.
Edward L. Lawrence.....	Agriculture.....	Fruit Vale.
Edward M. Louisson.....	Engineering.....	San Francisco.
Millie Medbery.....	Chemistry.....	Berkeley.
Hiram F. F. Merrill.....	Engineering.....	Denverton.
Jerome Newman.....	Engineering.....	San Francisco.
Fred. G. Ostrander.....	Agriculture.....	Merced.
Walter M. Painter.....	Agriculture.....	San Francisco.
Joseph B. Pownall.....	Chemistry.....	San Francisco.
Nannie N. Ridge.....	Literary.....	Grass Valley.
Abraham Ruef.....	Classical.....	San Francisco.
John W. Ryan.....	Mining.....	Oakland.
May L. Shepard.....	Literary.....	Berkeley.
Andrew Thorne.....	Literary.....	San Francisco.
Earle A. Walcott.....	Literary.....	Santa Barbara.
Frank J. Walton.....	Literary.....	San Buenaventura.
Harry D. Wilson.....	Literary.....	Oakland.
Total.....		45.

## FOURTH, OR FRESHMAN CLASS.

Name.	Course.	Residence.
Herbert G. Armstrong	Literary	San Francisco.
Henry S. Badger	Scientific	Oakland.
Joseph E. Barber	Classical	Temescal.
Horatio J. Barling	Literary	San Francisco.
William F. Barton	Classical	Alameda.
William A. Beatty	Literary	San Francisco.
Angie C. Bemis	Literary	San Francisco.
Frank L. Blinn	Literary	San Francisco.
William F. Bradford	Scientific	Sonora.
Daniel Brown	Literary	Petaluma.
Lee Brown	Literary	Sacramento.
Alice Chapman	Literary	Nevada City.
John L. M. Chase	Literary	Martinez.
Ernest W. Conant	Scientific	San José.
Channing H. Cook	Literary	Oakland.
Nona L. Dibble	Literary	Berkeley.
John J. Emery	Scientific	Oakland.
Jesse E. Frick	Literary	Lewiston.
Daniel M. Gavigan	Scientific	San Francisco.
Charles J. Greene	Literary	Red Bluff.
George T. Griffin	Literary	San Francisco.
Alexander Hamilton	Literary	Sacramento.
John J. C. Hampton	Literary	Sonora.
Eugene Hoefler	Scientific	San Francisco.
Amos W. Huggins	Scientific	East Oakland.
Charles L. Huggins	Scientific	East Oakland.
Frank E. Hunewill	Literary	Bridgeport.
Albert de M. Johnson	Literary	Sacramento.
Alexander D. Jones	Scientific	San Francisco.
David L. Leszynsky	Classical	San Francisco.
J. Edwin McMahan	Scientific	Dixon.
John McNear	Scientific	Oakland.
S. E. Mezes	Scientific	
Herschel B. Miller	Scientific	North Temescal.
Isabelle J. Miller	Literary	San Francisco.
Charles T. Millikin	Scientific	
Blanche E. Newell	Literary	Oakland.
James F. Peck	Scientific	Merced.
Richard Pinto	Literary	San Francisco.
James H. Pond	Classical	San Francisco.
Frank H. Powers	Scientific	Sacramento.
Charles A. Ramun	Scientific	Camptonville.
Edgar Reinhart	Literary	San Francisco.
Charles A. Robinson	Scientific	Snelling.
Thomas B. Russell	Scientific	Haywards.
Margaret Scobbie	Literary	San Francisco.
Gustavus C. Simmons	Scientific	Sacramento.
Charles Stewart	Scientific	Berkeley.
Samuel T. Stine	Literary	Yreka.
Bella C. Taggart	Classical	San Francisco.
Harry Taylor	Literary	San Francisco.
William B. Turner	Literary	Pescadero.
Frank Tuttle	Literary	Oakland.
Mabel Walcott	Literary	Santa Barbara.
Maude Walcott	Literary	Santa Barbara.
Sterling Wallace	Scientific	North Temescal.
Charles S. Wheeler	Literary	Oakland.
Clinton M. Wilbur	Classical	San Francisco.

Total ..... 58.



## STUDENTS AT LARGE.

Name.	Course.	Residence.
Ella F. Bailey	Literary	San Francisco.
Fannie Bernstein	Literary	Los Angeles.
Orlon Black	Literary	San Francisco.
W. W. Brier, Jr.	Scientific	Centerville.
Fred. H. Clark	Classical	Berkeley.
Joseph L. Crittenden	Mining	San José.
John C. Dement	Scientific	San Francisco.
Adelaide E. Graham	Literary	Berkeley.
Reinhardt T. Harding	Literary	Oakland.
Edwin M. Hawley	Literary	Alvarado.
William Herrod	Scientific	Grass Valley.
John W. Mailliard	Scientific	San Rafael.
Fletcher F. Ryer	Classical	San Francisco.
George F. Schorr	Literary	Gridley.
Hattie J. Shaw	Literary	Berkeley.
Adrian H. Snider	Classical	Sacramento.
W. B. Storey	Mechanics	Colfax.
Daniel Suter	Chemistry	San Francisco.
Henry W. Walker	Classical	San Mateo.
Frank Wilkins	Literary	Colusa.
Crayton W. Wilkinson	Mechanics	Berkeley.
Total		21.

## PARTIAL COURSE STUDENTS.

Name.	Course.	Residence.
Jeremiah Ahern	Engineering	Berkeley.
Lizzie R. Beggs	Literary	San José.
Carrie Brier	Literary	Centerville.
Louise Brier	Literary	Centerville.
Hattie E. Buchanan	Literary	Berkeley.
Warren S. Clarke	Literary	Berkeley.
E. C. Clowes	Literary	Stockton.
James B. Cowden	Literary	Woodbridge.
Adelaide Cushing	Literary	Oakland.
Franklin H. Davis	Agriculture	San Andreas.
Martha S. Day	Literary	Berkeley.
Mrs. — Gaines	Chemistry	Berkeley.
Helen M. S. Gompertz	Literary	Berkeley.
Charles J. Greene	Literary	Red Bluff.
Hattie I. Hager	Literary	Oakland.
William P. Hook	Literary	Oakland.
Fredrica H. de L. de Laguna	Literary	Oakland.
Carrie LeConte	Literary	Berkeley.
Annie S. E. Long	Literary	Berkeley.
Shelby F. Martin	Scientific	Oakland.
Mrs. A. McKinstry	Literary	Berkeley.
Jennie McKinstry	Literary	Berkeley.
Louise D. McKinstry	Literary	Berkeley.
W. H. Mills	Chemistry	Oakland.
Alfred Roncovieri	Agriculture	San Francisco.
Emma Shogren	Literary	San Francisco.
Willie W. B. Stevens	Literary	Berkeley.
George P. Thornton	Scientific	San Francisco.
Effie E. York	Literary	Oakland.
Total		29.

## SPECIAL STUDENTS.

Name.	Course.	Residence.
William M. Arthur	Chemistry	Oakland.
Yezaburro Arrow	Chemistry	Berkeley.
Clara Bartling, Ph. B.	German	Oakland.
Lottie E. Bentley	German	Oakland.
Arthur J. Caire	Mining	Oakland.
Mary J. Connell	German	San Francisco.
Emma H. Hilton	German	Oakland.
George B. Jacobs	Chemistry	Oakland.
Frank MacManus	Mining	Oakland.
Arthur B. Merrill	Spanish	Berkeley.
Herman Partsch	Agriculture	Cholome Valley.
W. R. Poyzer, Ph. B.	Mining	Grass Valley.
Avery Seoville	Mining	Oakland.
G. W. Stewart	Chemistry	Benton.
William H. Taylor	Mining	Oakland.
May B. Treat, Ph. B.	German	Oakland.
Arria M. Wertz, Ph. B.	German	Oakland.
Total		17.

## GRADUATES.

GRADUATES, JUNE 2d, 1880, WITH THE SUBJECTS OF THEIR THESES.

## BACHELORS OF PHILOSOPHY (SCIENCE).

Geo. A. Atherton	"Design of an Iron Railroad Bridge, triangular system, with plans, specifications, and estimates."
H. W. Bodwell	"Original Design for a Roof Truss over a Railroad Depot."
H. W. Carroll	"A Description and Discussion of the Chloridation Process at the Providence Mine."
G. E. Colby	"Analysis of two California Wheats."
J. G. Conrad	"The Frue Ore Concentrator."
O. M. Enslow	"Design for a Roof Truss for a large Machine Shop."
L. H. Long	"The Eames Petroleum Furnace."
H. C. Perry	"Original Design of a Railroad Truss Bridge, with detailed drawings, specifications, and estimates."
E. H. Shepard	"Analysis of Basaltic Rock."
A. H. Weber	"Analysis of an Eruptive Rock from Napa Valley."

## BACHELORS OF PHILOSOPHY (LETTERS).

Sarah Bolton	-----
	"The Conventional in Art."
Edith Briggs	-----
	"Schiller's Maid of Orleans."
E. L. Collins	-----
	"Socialism in Germany."
W. Dinsmore	-----
	"Proper Relations of Government to Industry and Trade."
J. H. Durst	-----
	"Minority Representation."
D. W. Fox	-----
	"American Education."
L. N. France	-----
	"The Origin of Government."
J. P. Gray	-----
	"Recent Phases of the British Land Question."
L. G. Harrier	-----
	"Finances of the French Revolution."
H. R. Havens	-----
	"English Rhythm."
Mary A. Hawley	-----
	"English Spelling Reform."
J. Hoeck	-----
	"The State in its Relation to Religion."
G. Hughes	-----
	"Defects of the Electoral System."
J. E. La Rue	-----
	"History of the Wages Fund Theory."
M. C. Meyer	-----
	"Wordsworth's Social Philosophy."
W. E. Osborn	-----
	"The Imagination."
A. L. Whitney	-----
	"Effects of Improved Methods of Production on the Laboring Classes."
Katie F. Woolsey	-----
	"Popular Ballads."

## BACHELORS OF ARTS.

S. A. Chambers	-----
	"The Selection of the American President."
A. A. D'Ancona	-----
	"The Relations of Ireland to England."
Belle D. Davis	-----
	"Goethe's Influence on the Nineteenth Century."

M. S. Eisner	-----	"Should England Return to Protection?"
C. C. McCarty	-----	"Does the Higher Education make a Man Unpractical?"
Lulu E. Medberry	-----	"The Progress of Morality."
M. J. Platshek	-----	"On the Financial History of the Eastern Empire."
M. Seeligsohn	-----	"National Debts."
Milicent W. Shinn	-----	"Ethical Possibilities of Man."
A. D. Tenney	-----	"Matthew Arnold's View of the Bible."

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### COMMENCEMENT SPEAKERS.

#### CLASS OF EIGHTEEN HUNDRED AND EIGHTY.

Milton S. Eisner	-----	San Francisco.
		Oration, "The Force of Individuality."
Milicent W. Shinn	-----	Niles.
		Essay, "The Real Sources of Satisfaction in Life."
Samuel A. Chambers	-----	Sacramento.
		Oration, "An Evil and its Remedy."

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### UNIVERSITY MEDAL.

Class of 1880	-----	Mary Alice Hawley.
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### OFFICERS OF THE BATTALION UNIVERSITY CADETS.

*Commandant of Cadets*—Colonel George C. Edwards.

#### FIELD AND STAFF.

*Major*—D. Lindley.

*Second Lieutenant and Adjutant*—P. E. Bowles.

*Second Lieutenant and Quartermaster*—C. E. Edwards.

*Second Lieutenant and Inspector of Rifle Practice*—J. J. McGillivray.

*Sergeant Major*—H. M. Edmonds.

#### COMPANY OFFICERS.

*Captains*—W. B. Storey, R. W. Clarke, H. G. Kelsey, Seth Mann.

*First Lieutenants*—H. Russell, L. C. Fisher, J. A. Shaw, R. Moore.

*Second Lieutenants*—C. M. Coon, D. Suter, J. J. Dwyer, C. H. Oatman.

*First Sergeants*—D. Barcroft, D. S. Dorn, R. D. Jackson, O. W. Jasper.

*Second Sergeants*—O. Black, B. Bienenfeld, C. E. Hayes, J. W. Atkinson, W. W. Brier, N. A. Rideout.

*Third Sergeants*—G. F. Schorr, H. L. Weed.

*First Corporals*—J. Ahern, G. F. Whitworth, A. M. Armstrong, N. Searls.

*Second Corporals*—S. E. Goodall, W. W. Deamer, E. Frick, F. H. Clark, J. A. Roncovieri, F. J. Walton.

*Corporals and Color Guard*—L. B. Johnson, W. C. Fife, J. Newman, H. W. Walker, E. N. Harmon, A. L. Kelsey, W. E. Conner.

## OUTLINE OF THE INSTRUCTIONS GIVEN IN THE DIFFERENT BRANCHES OF STUDY.

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NOTE.—The outlines here given are of such studies or courses of study only as are common to several or all of the Colleges of Science and of Letters. The special studies peculiar to the particular Colleges are given in detail in the statements of the different Colleges on later pages of the Report.

### MATHEMATICS.

#### FRESHMAN CLASS.

*Algebra*.—Solution of Equations, first and second degrees; Binomial Theorem; Extraction of Roots of any degree, both of numbers and algebraic quantities; Operations on Radicals of any degree, and upon quantities affected with fractional and negative exponents; Progressions and Proportions; Principle of Indeterminate Co-efficients; Summation of Series by the method of Differences, and by special methods; Solution of Exponential Equations; Theory of Logarithms; General Theory of Equations; different methods of Solving Numerical Equations of any degree. TEXT-BOOKS: Davies' New Bourdon, and Clarke's Algebra.

*Geometry*.—Instructions in Plane Geometry; Geometry of Three Dimensions, and Spherical Geometry; Exercises in Geometrical Invention; Loci; Symmetry; Maxima and Minima by Geometrical Methods; Harmonic Proportion and Harmonic Pencils; Polars, Centers of Similitude, etc. TEXT-BOOK: Olney's Geometry.

#### SOPHOMORE CLASS.

*Trigonometry and Mensuration*.—Thorough practical instruction in the use of Tables of Logarithms and Logarithmic Functions, Plane and Analytical Trigonometry; Spherical Trigonometry, and Mensuration. TEXT-BOOK: Olney's Trigonometry.

*Analytical Geometry*.—Determinate and Indeterminate Geometry, including a full Examination of the Properties of the Conic Sections. TEXT-BOOK: Church's Analytical Geometry.

*Descriptive Geometry*.—Spherical Projections; Shades, Shadows, and Linear Perspective. TEXT-BOOK: Church's Descriptive Geometry.

#### JUNIOR CLASS.

Differential and Integral Calculus, and the Calculus of Variations. TEXT-BOOK: Church's Calculus.

### PHYSICS AND MECHANICS.

The course of instruction in PHYSICS AND MECHANICS, for the Colleges of Science, commences with the Second, or Sophomore, year of the regular course, and is completed in three years.

The students in the Sophomore Class are occupied with the subject of HEAT: including Thermometry; Laws of Expansion of Solids, Liquids, and Gases; Laws of Conduction and Convection; Laws of Liquefaction and Solidification; Laws of Ebullition; Laws of Elastic Force of Vapors; Theory of Steam Engine; Laws of Vaporization and Condensation; Spontaneous Evaporation; Hygrometry, Laws of Specific Heat; Sources of Heat; Mechanical Equivalent of Heat; Heat of Combustion; Dynamical Theory of Heat.

Then commences the Course on MECHANICS: embracing General Properties of Matter; Measurement and Representation of Forces; Momentum; Uniform Motion; Uniformly Accelerated and Retarded Motion; Laws of Motion; Composition, Resolution, and Equilibrium of Forces; Composition and Resolution of Motions and Rotations; Principle of Moments; Theory of Parallel Forces; Theory of Couples; Curvilinear Motion, and the Laws of Centrifugal Force.

The students in the Junior Class continue the study of MECHANICS: including Laws of Gravity; Laws of Central Forces; Laws of Falling Bodies; Application of Theory of Parallel Forces to Center of Gravity and Stability; Elementary Machines and Theory of Machinery; Laws of Friction and Resistance to Motion; General Theorem of Work; Maximum Effect of Machines and Animals; Motion on Inclined Planes; Vibratory of Motion; Theory of Pendulum and Applications; Laws of Impact; Moment of Inertia; Theory of Projectiles and application to Gunnery. MECHANICS OF LIQUIDS: including Transmission of Pressure; Pressure due to Weight; Buoyancy and Floatation; Application to Specific Gravity. MOTION OF LIQUIDS: Spouting Liquids; Motion of Water in Pipes, Canals, and Rivers; Theory of Water Motors, and the Power of the various kinds of Water-wheels. MECHANICS OF GASES: including Laws of Compressibility and Elasticity; Pressure of the Atmosphere; Barometric Formula; Applications to Pumps, Siphons, Fire Engines, etc.; Theory of Resistance of Fluids.

The students of the Senior Class study: Mechanics of Capillarity. ELECTRICITY: including Laws of Electrical Action; Distribution of Electricity; Electrical Induction; Theory of Dielectric Induction; Theory of Leyden Jar and Electric Battery; Electric Light; Mechanical and Chemical Effects of Electricity; Cause of Electrical Phenomena; Atmospheric Electricity; Thunder Storms; Lightning-rods. MAGNETISM: embracing Laws of Magnetic Forces; Terrestrial Magnetism; Declination, Variation, and Dip of the Magnetic Needle; Diamagnetism. ELECTRO-MAGNETISM: including Fundamental Laws of Electro-Dynamics; Power of Electro-Magnets; Electro-Dynamic Induction; Magneto-Electricity; Theory of Induction-Coil; Thermo-Electricity; Law of Ohm; Economy of Electric Motors; and Theory of Electric Telegraph. ACOUSTICS: including Propagation of Sound, and Elastic Waves; Reflection, Refraction, and Interference of Sounds, Physical Theory of Music. OPTICS: embracing Theories of Propagation of Light; Velocity of Light; Photometry; Laws of Reflection and Refraction; Dispersion of Light; Spectroscope; Theory of Rainbows and Halos; Interference of Light; Diffraction; Polarization of Light; Theory of Vision; Theory of Optical Instruments.

The method of instruction is by means of lectures and recitations, accompanied by experimental demonstrations and the solution of practical problems.

TEXT-BOOK: Snell's edition of "Olmsted's Natural Philosophy." Recommended for reference: Atkinson's edition of Ganot's "Physics;" Lardner's "Hand-Book of Natural Philosophy;" Silliman's "Principles of Physics;" Peck's Mechanics.

In the College of Letters, a short course on Physics and Mechanics, commencing with second term of Junior year and continuing through two terms.

TEXT-BOOK: Deschanel's "Mechanics, Hydrostatics, Pneumatics, and Heat."

The cabinet of physical apparatus is very complete, and additions are to be made to it each year.

## BOTANY.

Instruction in Botany begins with the Sophomore year. The study of Structural and Physiological Botany occupies the first term, the general course pursued being that of Gray's work on Structural Botany, which is used as a work of reference. The lectures, alternating with recitations, are fully illustrated, partly by large scale drawings, partly by figures thrown on a screen by the magic lantern (Marcy's "Sciopticon.")

Systematic and Economic Botany occupies the second term. After a discussion of the general principles of classification, the more important orders of the vegetable kingdom are taken up and fully characterized and illustrated. In connection with each, its economically important members are discussed and illustrated by figures and specimens, together with such details in regard to their culture and uses as are of interest to the general student.

The course of General and Economic Botany is optional for the students of the two literary courses, but its first term is obligatory for those of the scientific courses. It serves especially as an introduction to the agricultural course proper, from the most attractive point of view.

## GEOLOGY AND NATURAL HISTORY.

The course of lectures in this department will commence in the Junior year with *Zoölogy*. It will include the comparative anatomy and physiology of animals and the principles of classification, and will be illustrated by a full set of diagrams, by the free use of the microscope, and, whenever possible, by dissections.

REFERENCES: Huxley's "Comparative Anatomy of Vertebrates;" Milne Edward's "Manual of Zoölogy;" Rymer Jones' "Animal Kingdom;" Todd's "Cyclopedia of Anatomy and Physiology;" Nicholson's "Manual of Zoölogy;" and Orton's "Comparative Zoölogy."

Geology will commence with the Senior year. The first term will be occupied with lectures on *Dynamical and Structural Geology*. Under Dynamical Geology will be taken up all the agencies now at work modifying the earth's surface and producing structure, viz: Atmospheric Agencies; River Agencies; Glacial Agencies; Ocean Agencies; Igneous Agencies; Organic Agencies; etc. Under Structural Geology will be discussed the General Structure of the Earth; the Structure and Position of Rocks; the Formation and Distribution of Fossils; the Occurrence and Origin of Mineral Veins; the Structure and Mode of Formation of Mountain Chains; etc. The lectures of the second term will be devoted to the History of the Earth and its

Inhabitants. This history will be illustrated principally from American Geology, and, as far as possible, from the Geology of the State. Throughout the course special attention will be devoted to points of special interest, scientific or practical. The course is thoroughly illustrated by the use of an ample museum of rocks, ores, and fossils, and an extensive collection of Ward's Geological Casts.

REFERENCES: Dana's "Manual of Geology;" Lyell's "Principles of Geology;" Lyell's "Elements of Geology;" De la Beche's "Geological Observer;" Juke's "Manual of Geology;" Le Conte's "Elements of Geology."

## MINERALOGY.

The course of lectures upon this subject is delivered to the Junior Class. The first term is mainly occupied with the discussion of the *Physical Properties of Minerals*, including their optical properties, their morphological properties (Crystallography), hardness, specific gravity, etc. Descriptive Mineralogy is also commenced during the latter part of this term, and is finished by the end of the second term. Special attention is paid to the ores—the manner of their geological occurrence, and the most important ore deposits of this country are especially described. A sufficient time at the conclusion of each lecture is devoted by the students to the careful examination of the minerals considered during the lecture. The lectures are fully illustrated by the use of the microscope.

During the Senior year, two hours a week are devoted to work in the mineralogical laboratory, in the practical determination of minerals by means of their physical properties alone. For this purpose, a special students' working collection has been arranged, consisting of the most common and important minerals, particular attention being paid to the ores. These are left unlabeled, and it is the work of the student to determine each species, with the use simply of a knife, a lens, a streak plate, and the general knowledge he has already derived of their physical appearance. The careful, conscientious determination of the minerals in this collection will enable the student to determine quickly and readily all of the common minerals, with the use of the above-mentioned instruments—such as can be carried in the vest pocket.

During the Senior year, a course of lectures is given upon the practical determination of minerals with the blow-pipe, *i. e.*, by means of their *chemical* properties, entirely independent of their *physical* properties. In addition to the lectures, the student has two hours a week laboratory practice with the blow-pipe.

It is earnestly recommended to those students intending to pursue the study of mineralogy as a specialty, that they make themselves familiar with the German language.

WORKS OF REFERENCE: Dana's "System of Mineralogy," (fifth edition); Nauman's "Mineralogie," (ninth edition); Weisbach's "Synopsis Mineralogica;" Frazer's translation of Weisbach's "Tabellen zur Bestimmung der Mineralien nach äusseren Kennzeichen;" Prime's translation of Von Cotta's "Lehre von den Erzlagertstätten;" Cornwall's translation of Plattner's "Probirkunst mit dem Löthrohre."



## CHEMISTRY.

Instruction is given in General and Theoretical Chemistry by lectures, recitations, and laboratory practice. This course extends through three terms, one in Freshman year and two in Sophomore year, and embraces the elements of inorganic and organic chemistry. Students, after making themselves familiar with the details of experiments, are required to repeat the same in the laboratory for elementary chemistry.

An advanced course of lectures will be given to students of the Junior and Senior Classes, in general and theoretical chemistry. This course will embrace a discussion of the general principles of the science, and their application to analytical and metallurgical chemistry, and to mineralogy.

The chemical laboratories are open daily for instruction and analytical chemistry.

The special courses in chemistry are given in the statements about the College of Chemistry.

## SURVEYING.

Instruction in this branch is given by recitations, lectures, use of text-books and works of reference, and field-work. The general course in Surveying in the Colleges of Letters, Agriculture, Mechanics, and Chemistry is given in the latter half of the second term of the Sophomore year.

TEXT-BOOK: Murray's "Manual of Surveying."

The special courses in Civil and Mining Engineering are given in the statements of the Colleges of Engineering and Mining.

## INDUSTRIAL DRAWING.

### SOPHOMORE CLASS.

*First Term.*—Construction of geometrical problems relating to points, lines, circles, and polygons, and drawing of combinations of these problems to give practice in the use of instruments.

*Second Term.*—Drawing of problems in Descriptive Geometry, following the course given in this branch; practice in lettering for maps.

### JUNIOR CLASS.

*First Term.*—Application of Descriptive Geometry to constructions of the Civil and Mechanical Engineer. Platting of field notes in surveying and leveling, and mapping, following the course in Civil Engineering.

*Second Term.*—Application of Descriptive Geometry continued, with shades and shadows. Platting of road and railroad work, earthwork, etc., following the course.

### SENIOR CLASS.

*First Term.*—Construction of simple machines, screws, helical surfaces, teeth of wheels, gearing, etc.; examples of stone-cutting and masonry constructions.

*Second Term.*—Drawing machine parts from models, etc.; drawing of joints, framing bridges, roofs, etc., following the course.

## ASTRONOMY.

Instruction in Astronomy to Engineering students extends through both terms of the Senior year.

It is given by means of recitations, lectures, and the use of text-books and works of reference, globes, charts, etc.

The text-book employed is Norton's *Treatise on Astronomy*. The general course is concluded at the end of the first term. During the second term, instruction in the theory and use of astronomical instruments, in practical astronomy, and in geodesy, is given to the students of civil engineering.

WORKS OF REFERENCE: Woodhouse's, Herschel's, Brunnows's Guillemin's, Loomis' *Practical Astronomies*; American and English *Ephemeris*; Proctor's various *Assays*; Watson's *Chauvenet's*, and Narrien's *Astronomies*; LaPlace's "*Mechanique Celeste*," etc., and Grant's "*History of Physical Astronomy*."

## ENGLISH.

The study of English follows three lines: 1. The study of the language in its history and structure; 2. The study of its literature; 3. The attainment of skill in its practical use. The course in each may be outlined as follows:

### ENGLISH LANGUAGE.

In the Freshman year, the College of Letters, lectures are given on the History and Structure of English. In the Junior year, Anglo-Saxon and comparative philology, in March's "*Comparative Grammar of Anglo-Saxon*" and "*Anglo-Saxon Reader*," are studied. In the Senior year the course in the College of Letters includes the study of Whitney's "*Language and the Study of Language*." Accompanying this a course of lectures on language is given to the whole class.

### ENGLISH LITERATURE.

In the Freshman year lectures are given on Books and Reading, and the Use of the Library. In the Junior year Arnold's "*Manual of English Literature*" is studied, and in connection with this, Taine's "*History of English Literature*." Special prose authors are also studied by the class individually, with results given in essays and reviews. In the Senior year, in the first term, critical study is given to prose authors; in the second term, to the poets. Lectures are given on Literature.

### ENGLISH COMPOSITION AND RHETORIC.

In the Freshman year Bain's *Rhetoric* is studied. Compositions are written. Written translations are required in the classical course. Abbott's "*How to Write Clearly*" is studied.

In the Sophomore year compositions are written and addresses delivered by the students, in exposition and argument. In the Junior and Senior years practice in composition is continued, in various styles, as well as practice in speaking from notes and without notes.

## HISTORY, POLITICAL ECONOMY, AND POLITICAL SCIENCE.

Instruction in these subjects begins with the second term of the Sophomore year, and continues four terms, at the rate of four hours a week. It is addressed to the students of the College of Letters. In the first and second terms, History is studied; in the third, Political Economy; in the fourth, Political Science, or the nature and history of political institutions.

The instruction is given through text-books and lectures.

## MODERN LANGUAGES.

The study of French or German, at the option of students, is required in all the scientific colleges, commencing with the Freshman year. In the College of Letters, Classical Course, there is the same requirement, commencing with the Sophomore year. Students in the Literary Course of the College of Letters will be required to study both German and French, commencing one of them with the Freshman and the other with the Sophomore year. In German, the following text-books will be used in the order in which they are given here: "A German Course; adapted to the use of Colleges," etc., by G. F. Comfort; Comfort's "German Reader;" Whitney's Grammar, for reference; selections from Goethe, Schiller, Lessing, Uhland, Buerger, Heine, Chamisso, and other prominent German writers. During the whole course, translations from the English will be required. Koehler's or Whitney's Dictionary is recommended; any other good work will do. In French, the text-books for this academic year are as follows: Grammars—Otto, Poitevin, and Languellier and Monsanto. For Translation—*Histoire du Peuple Francais*, par Paul Lacombe; *La Littérature Francaise Contemporaine*, par Mennechet; *Littérature Francais, XVIII<sup>me</sup> et XIX<sup>me</sup> siècles*, par J. Demogeot; Corneille—*Le Cid*, Cinna; Molière—*Le Misanthrope*, *Les Femmes Savantes*; Racine—*Athalie*, *Esther*.

Spanish is an optional study for students in the College of Letters, and the course of instruction is so organized as to allow all who wish to have the benefit of instruction without interfering with their obligatory studies. In the Scientific Colleges it is elective from the second term of the Junior year, and optional before that time.

The text-books used are, for beginners: A Practical Course with the Spanish Language, by Monsanto and Languellier. Second term—Tolou's Spanish Reader; *Compendio de la Gramática Castellana*, by P. Hernandez. Third Term—Mantilla's *Libro 2º*; English and Spanish Dictionary, by Velasquez. Fourth Term—*Don Quijote*, by Ticknor. The Grammar of the Spanish Academy, Spanish Composition, and Literature, and free translations from English into Spanish.

## LATIN AND GREEK.

For particulars of the course in this department, see the statement under the College of Letters, classical course.

There are Sub-Latin Classes for the members of the literary course who have not passed the entrance examination of the classical course.

## HEBREW, CHALDAIC, AND SYRIAC.

The instruction in these languages is optional, and may be pursued by those students who desire it, at any period during their connection with the University.

## MILITARY SCIENCE.

The congressional enactment of 1862, from which a portion of the University funds was derived, requires instruction in military tactics.

The laws of California also require that the students be organized into a battalion, for military instruction and discipline.

It is expected that every member of the battalion will procure a uniform immediately after his admission.

The course of instruction includes:

I. Tactical instruction in the field and in the class-room, in the schools of the soldier, the company, the battalion, and skirmishers.

II. Lectures on the Art of War. These include the following topics: *Composition and Organization of Armies; Supply of Armies; Moving Armies; Passage of Rivers; Military Bridges; Field Fortification; Theory of Fire; Principles of Strategy; Historical Sketch of Small Arms.* Also, practice in making out reports, requisitions, etc.

## THE SCIENTIFIC DEPARTMENTS,

INCLUDING COLLEGES OF AGRICULTURE, MECHANICS, MINING,  
ENGINEERING, CHEMISTRY.

### GENERAL STATEMENTS RESPECTING THE SCIENTIFIC COLLEGES.

#### TERMS OF ADMISSION.

Candidates must pass a satisfactory examination in *Higher Arithmetic*, in all its branches, including the extraction of square and cube roots, and the metric system of weights and measures; *Algebra* (Davies' Bourdon or equivalent), as far as the General Theory of Equations; *Geometry*, the nine books of Davies' Legendre, or their equivalent from another author; *English Grammar*, *Rhetoric*, *Geography*, and *History of the United States*.

It is believed that these requirements can be met by a bright and determined scholar residing in any part of the State. The proper text-books are easily procured. The examination is meant to be thorough and strict, but it is not meant to be so technical or exacting as to deter scholars who have not had the best advantages of tuition. Students who show a capacity to pursue with profit the course marked out, are sometimes admitted on condition that they will make up their deficiencies. At the same time, thorough preparation, where it can be had, is of the greatest importance. Parents and teachers are earnestly requested to give good counsel in this respect to those who are coming to the University.

The following suggestions are made for the guidance of those who are able to do more than master the requisites above stated:

Although no requirements in Natural Science are specified, the study of Local Botany, Mineralogy, and Natural History is earnestly recommended, both because of the knowledge which may be acquired, and because of the habits of accurate observation of nature which may thus be formed in early youth.

Students are advised to devote at least one year to the study of Latin before entering this department. It will greatly help their acquisition of Modern Languages, and will be useful in their study of science. Allen & Greenough's Grammar and Reader are especially commended as good manuals for this purpose.

Proficiency in some one or more of the Modern Languages is also very desirable.

#### FOR ADVANCED STANDING.

Candidates for advanced standing, whether from other colleges or not, in addition to the preparatory studies, are examined in those already pursued by the classes which they propose to enter.

Applicants should be at least sixteen years of age, and bring satisfactory testimonials. Young ladies, as well as young men, are received as students.

Tuition is free to residents of California. Students from other States will be charged a matriculation fee of twenty-five dollars, and a tuition fee of fifty dollars per year, payable in advance, twenty-five dollars at the beginning of each half year.

#### OBJECTS.

The various Scientific Colleges of the University are designed to give the student a good introduction to the principles of modern science, together with special instruction in that particular department which he may choose. The law of the State requires the maintenance of five distinct colleges, or courses. These are Agriculture, Mechanics, Mining, Engineering, and Chemistry.

#### THE FIRST TWO YEARS.

The first two years of instruction, in all these colleges, include very nearly the same studies. A solid foundation is laid for all higher pursuits by the careful study of mathematics and the elements of chemistry, natural philosophy, physical geography, etc., as well as of English, French, and German. At the beginning of the third year the special subjects begin to predominate.

#### THE TWO ADVANCED YEARS.

In the two advanced years, the third and fourth of the full course, special attention is given to studies immediately relating to any one of the five colleges which the student may have elected—Agriculture, Mechanics, Mining, Engineering, or Chemistry. General studies receive a subordinate degree of attention.

#### SPECIAL COURSE STUDENTS.

Students who cannot spend four years at the University, but who are qualified to pursue the special studies here arranged for, are received as "Special Course Students," for a longer or shorter time. This is easier in the Colleges of Agriculture and Chemistry than in the other Colleges, which presuppose a considerable proficiency in mathematics.

## COLLEGE OF AGRICULTURE.

### GENERAL STATEMENTS.

*Terms of Admission.*—The terms of admission are the same as to the other Scientific Colleges, and are described on a previous page.

Special Students in Agriculture not desiring the full course, are received for a longer or shorter period, and may attend only special lectures and recitations and practical exercises, according to their requirements.

*Methods of Instruction.*—The instruction is given by experimental and illustrated lectures, recitations, essays, and class discussions, and in the practical application of principles upon the University grounds. In addition, orchards, vineyards, farms, dairies, and other places of agricultural interest and importance will be visited by the class, as far as practicable, under the guidance and instruction of the Agricultural Professor.

The University domain is being developed, with a view to illustrate the capability of the State for special cultures, whether of forests, fruits, or field crops, and the most economical methods of production. It will be the station where new plants and processes will be tested, and the result made known to the public. The labor of students is employed and paid for, whenever practicable.

The course of instruction, during the first two of the four years constituting the under-graduate course, is the same as for the other Scientific Colleges, except in so far as the work in the chemical laboratory is more especially directed to subjects cognate to Agriculture. During the two succeeding, or Junior and Senior years, the studies relating directly to the science and practice of Agriculture are given chief prominence.

The frequency with which the aim of such studies, and the attainable objects of Agricultural Colleges generally, are misunderstood, renders an explanation desirable. Those who consider Agriculture as consisting merely in the manual work of plowing, planting, cultivating, harvesting, and the care of stock, justly ridicule the idea of its being taught in a college. Apprenticeship on a well-conducted farm, or in labor schools, is the proper means for attaining this end, since it does not necessarily imply material intellectual progress, or education properly so called. It is not contended that such schools, or especially such apprenticeship, are not intrinsically useful and necessary. But the kind of training thus attained is clearly not that intended by the Act of Congress "for the liberal and practical education of the industrial classes," on which the agricultural and mechanical colleges of the several States are based; and experience in the East has abundantly shown that it is not the kind of education really desired by the industrial classes for their sons, since the want of patronage has, in every case, compelled a change towards the system which makes the manual exercise merely a means of fully illustrating the principles of rational Agriculture. It is not that they may learn to plow or hoe a little better, but to learn why to plow or

hoe at all, and when and where to do it to the best advantage, that parents are willing to dispense with their sons' services on the home farm. Without an educated judgment, directing the application of general principles under circumstances infinitely varied, a little knowledge and a great deal of local routine habit acquired on a model farm, are but too apt to obscure common sense, and to render the possessor eminently unpractical everywhere else. It may be thought that a certain amount of obligatory manual labor, over and above that necessary for practice and illustration, might profitably be enforced in order to maintain the habit. But the period of four years, now allotted to the educational course, is so short, in regard to the multiplicity of subjects in which an educated agriculturist should have a respectable knowledge, that the time for merely mechanical exercise cannot reasonably be spared. It is considered a hardship by the student, since such labor cannot, in an manner, constitute a recreation from study; nor, if rendered obligatory beyond the requirement of illustration of principles, is it conducive to maintaining or creating in the student's mind a preference for agricultural pursuits. When such preference is not the result of habits acquired at home, or of natural bias, enforcement of manual labor is not likely to promote its acquisition.

The operations and exercises on the agricultural grounds are intended to subserve two distinct functions. The first is, to serve for the illustration of the course of instruction, and for such practice as is given to chemical students in the laboratory, or to engineering students in field practice. They will show in actual growth and cultivation, so far as possible, all the plants of importance in an agricultural point of view, as well as the operations and implements employed in their culture.

The second and essentially distinct function is the performance of experiments in cultivation, soil improvement, manuring, etc. Such experimental operations, from their very nature, can serve for instruction to a limited extent only, and while of the most direct importance to the practical cultivator, are not necessarily connected with educational institutions, and are, as a rule, quite the reverse of lucrative. Moreover, since soils and climates can neither be artificially made nor transported, each distinct agricultural region requires, in a measure, its own local experimental station.

The course of instruction by the Professor of Agriculture will hereafter be as follows:

#### SOPHOMORE YEAR.

*First Term.*—Structural and Physiological Botany.

*Second Term.*—Systematic and Economic Botany.

Descriptive Botany, with exercises in the analysis and determination of plants. Excursions will be made occasionally throughout the session, as the seasons may render them profitable.

Economic Botany.—Description of plants useful and injurious to Agriculture, and their varieties.

#### JUNIOR YEAR.

*First Term.*—Economic Botany, concluded.

Agricultural Chemistry.

Chemistry of plants and their products. Nutrition of plants from



atmospheric sources. Inorganic ingredients of plants, their importance and derivation; ash analysis. Physics of plants; mechanicism of nutrition and movement of the juices. Germination and development of plants, and accompanying chemical changes.

*Second Term.*—Agricultural Chemistry (continued).

Chemistry and Physics of soils; their origin, formation, classification. Physical properties, their determination and influence; mechanical analysis. Chemical composition; relation to vegetable nutrition; chemical analysis, its methods, utility, and interpretation.

*Policy of Culture and Maintenance of Fertility.*—Exhaustion of soils by irrational culture; rotation of crops, green-manuring, fallowing, sub-soiling, thorough drainage, irrigation; manures, their kinds, preparation, use, and value; the irrational system of culture. General summary.

#### SENIOR YEAR.

*First Term.*—Culture.

Agricultural operations and implements, and their application in the cultivation of the several crops. Illustrative exercises in the agricultural grounds, whenever opportunity is afforded. Excursions.

*Second Term.*—Special Cultures, Stock-breeding, Dairying, etc.

The course of SPECIAL CULTURES will, so far as practicable with the means and appliances at the command of the University, be illustrated by the actual performance, under the eyes of and by the student, of the several operations on the growing crops themselves. Specimen plots of the latter will be kept on the University grounds for this purpose, year after year, whenever the necessary funds are at command. At the same time, class excursions to farms, ranches, and manufactories will at intervals be made, in order to show and discuss operations on a commercial basis, and the local modifications rendered necessary by the consideration of financial success.

It is hoped that hereafter the University will always be enabled to employ for instruction, in these special subjects, persons specially conversant with the best practice, both of California and of other countries.

The following works are required by the student for study and reference, but the instruction in this department will by no means be confined to the text-book, but made as original, and consequently independent thereof, as possible: Gray's Structural and Systematic Botany; Gray's Field and Garden Botany; Botany of California; Allen's American Farm Book; Thomas' "Agricultural Implements;" Johnson's "How Crops Grow" and "How Crops Feed;" Arnold on Dairying; Stewart on Irrigation.

It should be distinctly understood that for those intending to become practical farmers, a "practical course" or period of apprenticeship, on one or several well-conducted farms, subsequent to their course of study in the College of Agriculture, is considered to be as essential as it is in all other professions, all the world over. The requirements of instruction in principles, and those of financial success, are, as a rule, incompatible; and the attempt to force them upon the student's mind simultaneously, usually results in a confusion of theory and practice, which forms a serious impediment to success in life. But a knowledge of the principles upon which it is based, renders the acquisition of practice easy, pleasant, and interesting, and at once relieves manual labor from the reproach of being mere drudgery, which so often repels our youth from the pursuit of agriculture.

In addition to the main library of the University, which contains some fourteen thousand volumes, and which is open during fixed hours to the students of all the Colleges, the Agricultural College has a special and select library of several hundred volumes, which relate directly to farm life and labor.

Most of the recent American books on Scientific Agriculture have been placed in the Agricultural Library, so as to be accessible to students, for reference.

The leading agricultural journals of the United States, as well as those of California, can be found in the general library.

In the Museum, which is now being arranged as rapidly as the finances of the University will permit, specimens of the botany of the State, and of many indigenous and exotic woods, can be examined by the students; and the private collection of Professor Hilgard, containing some twelve thousand specimens of American and foreign plants, which are arranged and classified expressly for purposes of instruction and investigation, is deposited in the lecture room of this College, for the use of the students.

A cabinet of the soils, agricultural products, and manufactures of the State is being formed, and already contains numerous specimens.

The University also possesses the large collection of plants, rocks, etc., of the State Geological Survey, making, with the foregoing, an unusually extensive series of specimens for study.

The agricultural grounds of the University site will be fully prepared and occupied for purposes of experiment, instruction, and illustration, as rapidly as the financial resources of the institution will permit. A standard orchard of over six hundred varieties, planted in 1874-5, is now coming into bearing. About thirteen acres of ground have for the past three years been occupied for culture experiments, and with the aid of the funds provided for the purpose by the last Legislature, a portion of this tract is now being prepared as a Garden of Economic Plants, which will thus be shown to the student in actual growth. A garden of general botany will also be laid out so soon as the stock can be prepared, for which purpose, as well as for that of the ornamentation of the grounds, there are two Propagating Houses, with other needful buildings; also a convenient barn and appurtenances.

Realizing the fact that in order to give instruction of a truly practical character, Agricultural Colleges should be able to teach the students not only what should be done in certain suppositious cases, but also what, in fact and practice, they will have to do under the circumstances actually existing in their own State, the Regents, on the recommendation of Professor Hilgard, have made an appropriation, and authorized the appointment of an assistant analytical chemist, with a view towards the inauguration of a system of thorough investigation of the agricultural and industrial resources of the State, or what might be termed an Industrial Survey. Such a work is the needful complement of the Geological and Topographical Survey heretofore made, which forms its necessary basis, the results of which it will utilize and expand, and render practically available to the people of the State, by direct applications to every-day life.

The possession of the collections of the State Geological Survey is of especial importance and advantage in this connection.

In carrying out the portion of the work more directly related to Agriculture—the investigation of soils and of their relations and

adaptation to crops—the plan will be to obtain, first, a full knowledge of the occurrence, location, extent, natural peculiarities, and climatic position of each prominent variety of soil, by examination in the field; and at the same time to elicit by inquiry from those cultivating it, whatever of information or experience they may possess as to the soil's merits, demerits, peculiarities, or adaptations, thus gaining suggestions as to the most immediately important points to be investigated. Specimens of the soils, carefully taken to secure representative samples, will then be subjected to such examination, mechanical and chemical analysis, etc., as may be seen advisable in each case. The results of these investigations, with suggestions as to the soil's treatment and adaptation in culture, may then be published and subjected to the practical trial which must form the final test in questions of this nature.

So far as practicable, such tests, as well as experiments of a general nature relating to culture, manures, etc., will be conducted on the University grounds. But since it is impossible to realize in any one locality the conditions of soil, climate, etc., which govern the practical application of the results of the investigations proposed, such tests should most properly be made at local experiment stations, established for the purpose in each agricultural subdivision, as is done in Europe, as well as in some of the Eastern States. But Agricultural Societies, as well as intelligent individuals, may largely replace such stations for the present; and the coöperation of societies and individuals willing to aid in this work is most earnestly invoked and invited.

The knowledge thus obtained of the State's agricultural features—the kind, distribution, and adaptation of the soils, their modes of treatment and means of improvement—will not only enable the farmers to purchase and cultivate more intelligently and profitably, but it will render possible the publication of an authentic and accurate description of the State, conveying the information wanted by every immigrant, and the best possible advertisement of its industrial advantages. The students of the Agricultural College will then go out with definite foreknowledge of what they will have to deal with in actual life, and prepared to turn the knowledge acquired to direct account.

Communications, inquiries, specimens, etc., relating to Agriculture or cognate subjects, addressed to Professor Hilgard, will receive prompt attention and answer, so far as is practicable without the data to be supplied by the Agricultural Survey.

## SCHEDULE OF STUDIES.

### FOURTH, OR FRESHMAN CLASS.

*First Term.*—Mathematics—Algebra; French or German—(Begin); Rhetoric; English Composition; Drawing—Free-hand; Spanish—(Optional through the year).

*Second Term.*—Mathematics—Geometry; Chemistry—(Recitations and laboratory practice); French or German; English Composition; English—History of the Language; Drawing—Free-hand.

### THIRD, OR SOPHOMORE CLASS.

*First Term.*—Mathematics—Trigonometry (Plane and Spherical);

Analytical Geometry; Chemistry—(Recitations and laboratory practice); Physics—Heat; Structural and Physiological Botany; French or German; English Composition; Drawing—Industrial; Spanish—(Optional through the year).

*Second Term.*—Mathematics—Analytical Geometry completed; Chemistry—(Qualitative Analysis); Land Surveying and Leveling; Physics; Botany—Systematic and Economic; French or German; History—(Optional); Drawing—Industrial.

#### SECOND, OR JUNIOR CLASS.

*First Term.*—Economic Botany—Concluded; Agriculture—Chemistry of Plants, and their Products; Inorganic Chemistry—Lectures; Analytical Chemistry—(Qualitative and Quantitative); Mechanics; Zoölogy; German or French; History—(Optional).

*Second Term.*—Agriculture—Chemistry and Physics of Soils; Policy of Culture; Maintenance of Fertility; Inorganic Chemistry—Lectures; Analytical Chemistry—(Quantitative); Physics; Zoölogy; German, French, or Spanish—(Elective); History of English Literature—(Elective.)

#### FIRST, OR SENIOR CLASS.

*First Term.*—Agricultural Operations and Implements; Organic Chemistry—Lectures; Analytical Chemistry—(Quantitative); Physics—(Elective); Geology; Astronomy—(Elective); Political Economy.

*Second Term.*—Agriculture—Special Cultures, Stock-breeding, Dairying, etc.; Organic Chemistry—Lectures; Analytical Chemistry—Analysis of Soils, Manures, etc.; Physics—(Optional); Geology; Thesis—(Preparatory to graduation).

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## COLLEGE OF MECHANICS.

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#### GENERAL STATEMENTS.

*Terms of Admission.*—These are stated on a previous page.

*Objects of this Course.*—This College will educate mechanical engineers, machinists (so far as they are constructors of machinery), and others who wish to devote their energies to such technical and industrial pursuits as involve a knowledge of machinery.

*Course of Study.*—The full course of study of four years includes, like the other Scientific Colleges, two preliminary years, which give a general literary culture, besides the requisite mathematics.

The two advanced years give as much of the Civil Engineering Course as may be found necessary for the purposes of this College, including Mathematics, Physics, and Theoretical Mechanics. But the chief object will be to teach Applied or Industrial Mechanics; to show how the forces of nature are employed for industrial purposes; and to discuss the nature of the different constructions or machines contrived by human ingenuity.

Special attention is given to Industrial Drawing. The instruction in this department will be directed, in the advanced years, to the

construction of machinery as the principal object, and will advance as the instruction in Applied or Industrial Mechanics advances.

*Special Instruction in Applied Mechanics.*—The Course of Applied or Industrial Mechanics during the third and fourth years will be as follows:

### THIRD YEAR.

1. *Statics of Solids*: general principles of statics; center of gravity; equilibrium of restrained bodies (elastic and rigid); friction and rigidity of chords; application of the principles of statics to resistance of material; neutral surface of a deflected beam; shearing and torsional resistance; strength of pillars; compound resistance.

2. *Dynamics of Solids*: moment of inertia; centrifugal force; restrained motion under the influence of gravity; impact.

3. *Statics of Fluids*: equilibrium and pressure of liquids; buoyancy; molecular action of water; equilibrium and pressure of air.

4. *Dynamics of Fluids*: general principles of discharge; influence of contraction and friction; flow through pipes; influence of sudden change in cross section; discharge under variable pressure; discharge and flow of air; motion of fluids of various density; reaction and impact.

5. Application of mechanics to statical structures, with special reference to the construction of machines.

### FOURTH YEAR.

General introduction to the application of mechanics, power, useful effect, work.

*Prime Movers*: recipients for animal power, and that of water and wind; dynamometers; animal power; application of hydraulics to the reception and discharge of water (as used for water-power); vertical water-wheels; horizontal wheels (turbines); water-pressure engines; wind-mills.

*Heat, Steam, and Steam-engines*: mechanical equivalent of heat; properties of steam, and appliances for its generation; steam-engines; heat engines in general, and their efficiency.

*Elementary Forms of Mechanism*: general principles; interposed mechanism or communicators; wheel work, producing motion by rolling and wrapping contact; mechanism for modifying motion; screw; cam; producing motion by sliding contact; unusual means employed for modifying motion; variable motion by rolling contact; regulators and accumulators of motion.

*Working Machines*—1. Hoisting and transportation: lifting jacks, hydraulic press, hoists, hydraulic hoists, cranes, pile engine; application of hoisting machinery in mining; means employed for raising water.

2. Transmission of air by heat, compression or expansion, inertia and water.

3. Machines employed for change of form: stamp mills, steam and tilt hammers, and so forth.

4. Machines used in the arts of construction and for domestic purposes; excavator, dredging, drilling and punching machines, saw-mills, riveting machines, and so forth.

BOOKS RECOMMENDED FOR REFERENCE: Rankine's Manual of Applied Mechanics, and Weisbach's Mechanics.

## SCHEDULE OF STUDIES.

## FOURTH, OR FRESHMAN CLASS.

*First Term.*—Mathematics—Algebra; French or German—(Begun); Rhetoric; English Composition; Spanish—Optional through the year).

*Second Term.*—Mathematics—Geometry; Chemistry—(Recitations and laboratory practice); French or German; English Composition; English—History of the Language.

## THIRD, OR SOPHOMORE CLASS.

*First Term.*—Mathematics—Trigonometry, Plane and Spherical; Descriptive Geometry; Chemistry; Physics—Heat; Botany; French or German; English Composition; Drawing—Industrial; Spanish—(Optional through the year).

*Second Term.*—Mathematics—Descriptive Geometry (Shades, Shadows, Linear Perspective, Isometric Projection); Analytical Geometry; Land Surveying and Leveling; Chemistry; Physics; French or German; History—(Optional); Drawing—Industrial.

## SECOND, OR JUNIOR CLASS.

*First Term.*—Theoretical and Applied Mechanics—Lectures and Exercises; Mechanics; Zoölogy; Differential and Integral Calculus; German or French; History—(Optional); Drawing—Industrial; Spanish—(Optional).

*Second Term.*—Theoretical and Applied Mechanics—(Continued); Mechanics; Zoölogy—(Elective); Integral Calculus and Calculus of Variations; German, French, or Spanish—(Elective); Drawing—Industrial.

## FIRST, OR SENIOR CLASS.

*First Term.*—Theoretical and Applied Mechanics—Lectures and Exercises; Astronomy; Physics; Geology; Political Economy; Drawing—Industrial.

*Second Term.*—Theoretical and Applied Mechanics—(Continued); Physics; Geology; Drawing—Industrial; Thesis—(Preparatory to graduation).

## COLLEGE OF MINING.

## GENERAL STATEMENTS.

*Terms of Admission.*—The requirements are the same as for the other Scientific Colleges, and are stated on a previous page.

*Course of Instruction.*—The four years' course of instruction leads to the degree of Bachelor of Philosophy. Students who desire to receive the degree of Mining Engineer must continue their studies for at least two years more, and must exhibit to the Faculty satisfactory evidence of their power to apply in actual work the knowledge they have acquired.

During the first two years of under-graduate work, the studies of the course are the same as those of the other Scientific Colleges in the University of California. During the last two years the attention is directed chiefly to Chemistry, Metallurgy, Mining, Geology, Mineralogy, and Mechanical and Civil Engineering, though the study of modern languages is also kept up. The scientific studies are taught, as far as possible, with reference to their applications in mining, and the entire work of the last two under-graduate years and the post-graduate course is overlooked by the Lecturer on Metallurgy and Mining, under whose special guidance the mining students come.

The post-graduate years are devoted mainly to the study of Mining and Metallurgy, including studies on the spot of mines and smelting works, and essays embodying the results of observation.

Opportunities will be afforded to the class to visit some of the industrial establishments of San Francisco, and they will be encouraged to extend their visits to mining and metallurgical works at a distance.

*Collections and Laboratories.*—The laboratories for work in chemistry are new, extensive, and well furnished. They afford excellent opportunities for becoming proficient in Analytical Chemistry.

A Metallurgical Laboratory, designed to offer the very best facilities for the study of assaying, and to contain machinery and other appliances for the study of metallurgical processes, has been built during the past year. Its equipment will be commenced immediately.

The engineering instruments and the physical apparatus are also of the best kind.

There is a collection of beautiful models of furnaces, as well as one of furnace products.

The collection of Ores, Fossils, and Minerals are remarkable, including:

1. The materials of the Geological Survey of California, brought together by Professor J. D. Whitney, State Geologist.
2. The valuable mineralogical collection of Mr. H. G. Hanks, given to the University by Mr. James R. Keene.
3. The collection of ores, rocks, fossils, etc., collected by Mr. C. D. Voy, and presented by Mr. D. O. Mills.
4. The cabinet of the late Mr. F. L. A. Pioche.
5. The numerous gifts of other individuals.

The University also owns a large collection of the Ward Geological Casts.

## SCHEDULE OF STUDIES.

### FOURTH, OR FRESHMAN CLASS.

*First Term.*—Mathematics—Algebra; French or German—(Begun); Rhetoric; English Composition; Drawing—Free-hand; Spanish—(Optional through the course).

*Second Term.*—Mathematics—Geometry; Chemistry—(Recitations and laboratory practice); French or German; English Composition; English—History of the Language; Drawing—Free-hand.

## THIRD, OR SOPHOMORE CLASS.

*First Term.*—Mathematics—Trigonometry, Plane and Spherical; Descriptive Geometry; Chemistry; Physics—Heat; Botany; French or German; English Composition; Drawing—Industrial.

*Second Term.*—Mathematics—Descriptive Geometry (Shades, Shadows, Linear Perspective, Isometric Projection); Analytical Geometry; Chemistry; Physics; French or German; History; Drawing—Industrial.

## SECOND, OR JUNIOR CLASS.

*First Term.*—Mineralogy; Land and Mine Surveying and Leveling; Field Practice; Differential and Integral Calculus; Chemistry; Analytical Chemistry; Mechanics; German or French; Drawing—Industrial.

*Second Term.*—Mineralogy; Land and Mine Surveying and Leveling; Field Practice; Integral Calculus and Calculus of Variations; Chemistry; Analytical Chemistry; Mechanics; German or French—(Optional).

## FIRST, OR SENIOR CLASS.

*First Term.*—Metallurgy; Mineralogy; Analytical Chemistry and Laboratory Work; Astronomy; Physics; Geology; Political Economy.

*Second Term.*—Mining; Mineralogy; Analytical Chemistry and Laboratory Work; Physics; Geology; Thesis—(Preparatory to graduation).

## COLLEGE OF ENGINEERING.

## SPECIAL STATEMENTS.

*Terms of Admission.*—These are given on a previous page.

*Objects of the College.*—The object of this College is to give thorough instruction in those studies which pertain to the profession of a Civil Engineer. To a very considerable extent, these studies are likewise preliminary to the profession of an Architect. They are also serviceable to all who wish proficiency in the application of Mathematics and Physics, either with reference to teaching or to other pursuits.

*The Course of Study.*—The full course of study includes two preliminary years, in which are given not only the requisite mathematics, but many branches of general literary culture, the same as in the other Scientific Colleges; and also, two advanced years in, which the engineering and mathematical studies predominate. In the advanced years, instruction is also given to the students of this College in Physics, Geology, Zoölogy, and in certain literary branches, including Modern Languages, and Political Economy, with the intention of promoting, so far as can be done in the limited time, professional excellence and intellectual culture.

*Special Instruction in Engineering* begins with the Surveying Course, including Land Surveying, Leveling, Topographical Surveying, Use



of the Plane-table, Road and Railroad Surveying and Construction, with computations of earth-work required by excavations, tunnels, and embankments. A liberal amount of time is allotted to practice in the field, and to the use of instruments; such as the compass, level, field transit, plane-table, etc., and in the working up and plotting of field notes. Topographical drawing and map-making are taught in connection with this part of the course. During the present year an accurate topographical survey has been made, by the class, of the grounds immediately surrounding the University buildings. This will be mapped by them, and the work continued by successive classes till the entire tract is accurately plotted. The use of the Aneroid and Mercurial Barometers is taught, and practice given in the determination of heights, etc.

Journeys over the adjacent roads are made for the purpose of constructing itineraries, and of measuring and estimating distances by the eye alone, or with the ordinary available means of assistance. Sketches will be made of the surrounding country, and directions of hill ranges, streams, etc., will be taken as the basis of reconnaissance maps.

Students proficient in this course will be well fitted to undertake the work of the Field Engineer.

In the fourth year of the course, the characteristics and properties of the various building materials, wood, stone, iron, steel, mortar, mastic, etc., their strength, uses, and different methods of employment in structures, are discussed. The rules governing the construction of works of masonry, including foundations in dry and wet soils, and under water, stone bridges, dams, sewers, culverts, and retaining walls, are acquired.

Problems, relating to the more difficult constructions of masonry, such as groined, cloistered, askew, and rampant arches, domes and walls bounded by warped surfaces, etc., are solved, and by means of them working plans are drawn.

The principles and practice of framing, bridge and truss building, and the construction of estimates and working plans, are investigated; and the preparation of a careful thesis, on some topic in Engineering, selected or approved by the Professor of Engineering, terminates the under-graduate course, leading to the Degree of Bachelor of Philosophy (Ph. B.).

A practical bearing is given to the instruction of this year by the solution of interesting problems, connected with the subjects taught, and by visits to important structures, completed or in process of construction, which are accessible.

The text-books used are Gillespie's Surveying; Gilmore's Roads, Streets, and Pavements; Henk's Field Book; Wood's Resistance of Materials, and Bridges and Roofs. A course of lectures is given upon various engineering topics.

For reference, "Simm's Instruments," Frome's Trigonometrical Surveying, Reports of the United States Coast Survey, Reports of the United States Engineer Corps, their professional papers, etc., "The Plane-Table," as used by the United States Coast Survey; Smith's and Enthoffer's Topographical Drawing; Rankine's Civil Engineering, and Applied Mechanics; Weisbach's Mechanics of Engineering; Moseley's Mechanics of Engineering are recommended. A short course in surveying, leveling, etc., is given each year to students not in the College of Engineering.

A post-graduate course of two years' length, embracing the higher subjects of engineering study, leads to the degree of Civil Engineer (C. E.).

A valuable collection of surveying instruments, including rods, steel tapes, chains, hand and Y levels, theodolites, transits, solar and surveyor's compasses, plane table, etc., is in the possession of this department. There is an excellent assortment of models in wood of the various bonds of masonry and of different walls, arches, gateways, etc. Also, models in joints and fastenings in carpentry and framework; bridges and roof trusses; diagrams of various European and American engineering structures; the hypsometrical and surveying apparatus formerly belonging to the California Geological Survey.

The beautiful varied nature of the grounds at and about the University affords the finest field for practice in the various kinds of surveying; the department is well supplied with the necessary instruments, models, drawings, and maps, used in such instruction, and will avail itself of a generous gift from a citizen of Oakland, to further increase its condition.

## SCHEDULE OF STUDIES.

### FOURTH, OR FRESHMAN CLASS.

*First Term.*—Mathematics—Algebra; French or German (Begun); Rhetoric; English Composition; Spanish—(Optional through the year).

*Second Term.*—Mathematics—Geometry; Chemistry—(Recitations and laboratory practice); French or German; English Composition; English—History of the Language.

### THIRD, OR SOPHOMORE CLASS.

*First Term.*—Mathematics—Trigonometry, Plane and Spherical; Descriptive Geometry; Chemistry; Physics—Heat; Botany; French or German; English Composition; Drawing—Industrial; Spanish—(Optional through the year).

*Second Term.*—Mathematics—Descriptive Geometry (Shades, Shadows, Linear Perspective, Isometric Projection); Analytical Geometry; Physics; French or German; History; Drawing—Industrial.

### SECOND, OR JUNIOR CLASS.

*First Term.*—Land Surveying, Leveling, Topography, and Use of Plane-table—Field Practice; Engineering Drawing; Mechanics; Zoölogy; Differential and Integral Calculus; German or French; History—(Optional); Spanish—(Optional).

*Second Term.*—Road and Railroad Surveying and Building—Geodesy and Reconnoissances; Computations of Earth-work; Field Practice; Engineering Drawing; Mechanics; Zoölogy—(Elective); Integral Calculus and Calculus of Variations; German, French, or Spanish—(Elective).

### FIRST, OR SENIOR CLASS.

*First Term.*—Properties of Building Materials; Engineering Drawing; Astronomy—Use of Solar Compass; Physics; Geology; Political Economy.

*Second Term.*—Framing, Bridge Building, and Foundations; Engineering Drawing; Practical Astronomy; Physics; Thesis—(Preparatory to graduation).

## COLLEGE OF CHEMISTRY.

### SPECIAL STATEMENTS.

*Terms of Admission.*—The requirements are stated on a previous page.

*Objects of this College.*—The course of instruction in the College of Chemistry is designed for those who wish to become professional chemists, either as teachers and investigators, or as metallurgists, assayers, and manufacturers in chemical industries; and also for those who wish to become expert chemists preparatory to the pursuit of medicine, pharmacy, mining, etc.

The students of the Colleges of Agriculture, Mining, etc., have also the advantages of the chemical laboratory, but give a less amount of time to laboratory work than those who are especially enrolled in the College of Chemistry. Elementary instruction is also given to students of the College of Letters.

*The Course of Study.*—The full course of study of four years includes the same preliminary instructions as are given in the other Scientific Colleges, except that in the third term of the second year the student may take Surveying or Crystallography in place of Descriptive Geometry. It includes, also, during the third and fourth years, instruction in Mineralogy, Physics, Geology, Zoölogy, and in certain literary branches, including Modern Languages and Political Economy.

The special teaching in Chemistry may be thus described:

Instruction is given in General and Theoretical Chemistry by lectures, recitations, and laboratory practice. This course extends through three terms—one in the Freshman year and two in the Sophomore year, and embraces the elements of Inorganic and Organic Chemistry. Students, after making themselves familiar with the details of experiments, are required to repeat the same in the laboratory for Elementary Chemistry.

An advanced course of lectures will be given to students of the Junior and Senior Classes in General and Theoretical Chemistry. This course will embrace a discussion of the general principles of the science, and their application to Analytical and Metallurgical Chemistry, and to Mineralogy.

The chemical laboratories will be open daily for instruction in Analytical Chemistry.

The course of instruction in qualitative analysis will include the analysis of simple and complex substances in the wet way, their analysis by the use of the blow-pipe and flame reactions, and the determination of minerals by the blow-pipe. Students will be required to keep a careful record of their work, and to submit the same to the inspection of the Professor. Upon passing a satisfactory examination in qualitative analysis, students may pass to the quantitative laboratory.

In the quantitative laboratory instruction will be given in the quantitative gravimetric analysis of simple and complex salts, minerals, ashes of plants, mineral waters, etc.; in volumetric analysis, including acidimetry, alkadimetry, chlorimetry, etc.; in organic analysis; in gas analysis; in the preparation from inorganic and organic compounds, and in the carrying out of original investigation.

Students taking the course of Chemistry will be expected to spend at least fifteen hours a week in the laboratory during the Junior year, and twenty hours a week during the Senior year.

Every opportunity possible is made use of to give instruction in those branches of Chemistry which have a practical application to the arts. For example: a room for the study of photography, in connection with the chemical laboratory, will be opened as soon as the necessary apparatus can be supplied.

Practical instruction in electro-metallurgy will be given to such students as desire it.

Students in agriculture will receive special instruction in the analysis of manures, including the determination of phosphoric acid and nitrogen, etc.

So far as practicable, students will be employed in the preparation of chemicals used in the laboratories, the object being to give them as much practice in Manufacturing Chemistry as is possible.

Special training in the analysis of mineral waters will be given to such of the advanced students in Chemistry as may desire it.

Careful lists of waste products, minerals, etc., which may be utilized, will be kept, and students instructed in methods of saving them.

*Special Students in Chemistry.*—The advantages of the laboratory and lectures are open not only to those who pursue a full course of instruction, but to those who wish for a short period to pursue some special course, or carry on some special investigation. It should, however, be understood that this permission is not designed to furnish a means of escape from regular courses of study, but is for the benefit of persons who are already somewhat advanced in knowledge, and who desire to become acquainted with modern Chemistry.

*Visits to Chemical Establishments.*—It is the intention of the Professor of Chemistry to encourage the students to visit the various Chemical and Metallurgical works of the vicinity, so far as this is practicable.

*The Chemical Laboratory.*—The chemical laboratory at Berkeley has been fitted up at a large expense, and in accordance with the best experience of European and American laboratories. There are two main rooms—an upper and a lower room. The former is intended for quantitative analysis and original investigations, and has accommodations for thirty-two students. Adjacent to it are the laboratory and study of the Professor of Chemistry, the balance-room, and fusion-room. The lower room is intended for qualitative analysis, and has also accommodations for thirty-two students. Adjacent to it is a room for the instruction of literary and other students in Elementary Chemistry. The laboratories are open daily, including Saturdays.

*Charges for Chemicals.*—Students may be supplied with the necessary apparatus for chemical analysis from the laboratory. This will be charged to them, and may be returned to the laboratory if uninjured. Students will provide themselves with platinum ware and weights.

A charge of fifteen dollars a term will be made for chemicals used in chemical analysis. Students needing assistance, who are able and willing to render service in return for chemicals, may make application to the Professor.

## SCHEDULE OF STUDIES.

### FOURTH, OR FRESHMAN CLASS.

*First Term.*—Mathematics—Algebra; French or German—(Begun); Rhetoric; English Composition; Spanish—(Optional through the year).

*Second Term.*—Mathematics—Geometry; Chemistry—(Recitations and laboratory practice); French or German; English Composition; English—History of the Language.

### THIRD, OR SOPHOMORE CLASS.

*First Term.*—Mathematics—Trigonometry, Plane and Spherical; Analytical Geometry; Chemistry; Physics—Heat; Botany; French or German; English Composition; Drawing—Industrial; Spanish—(Optional through the year).

*Second Term.*—Mathematics—Analytical Geometry; Land Surveying and Leveling; Chemistry—(Qualitative Analysis); Physics; Botany—(Elective); French or German; History—(Elective); Drawing—Industrial.

### SECOND, OR JUNIOR CLASS.

*First Term.*—Inorganic Chemistry—Lectures; Analytical Chemistry; Mineralogy; Mechanics; Zoölogy; German or French; History—(Optional); Spanish—(Optional).

*Second Term.*—Inorganic Chemistry—Lectures; Analytical Chemistry; Mineralogy; Mechanics; Zoölogy—(Elective); French, German, or Spanish—(Elective).

### FIRST, OR SENIOR CLASS.

*First Term.*—Organic Chemistry—Lectures; Analytical Chemistry; Mineralogy—Laboratory practice; Physics; Geology; Astronomy—(Elective); Metallurgy—(Elective); Political Economy.

*Second Term.*—Organic Chemistry—Lectures; Analytical Chemistry; Mineralogy—Laboratory practice; Physics; Geology; Thesis—(Preparatory to graduation).

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## COLLEGE OF LETTERS.

### SPECIAL STATEMENTS.

*Objects.*—The College of Letters maintains two courses: one of them corresponding to the classical course, with which the public are familiar; and the other giving prominence to the Modern Languages, History, and Literature. The former, which is known as "the Classi-

cal Course," leads to the traditional degree of Bachelor of Arts; the latter, which is known as "the Literary Course," leads to the degree of Bachelor of Philosophy. In both these courses a liberal amount of time is bestowed upon the principles of modern science.

One or the other of these two courses will be found adapted to those who desire to lay a broad foundation of literary, historical, and scientific culture as a basis for further professional study. Those who expect to become teachers will notice the adaptation of these courses to their future vocation.

#### TERMS OF ADMISSION.

(1) *Classical Course*.—Candidates must pass a satisfactory examination in Higher Arithmetic; Algebra, to Quadratic Equations; Geometry, first four books (Davies' Legendre or Loomis'); English Grammar; Rhetoric; Geography; History of the United States; Latin Grammar, including prosody; Cæsar, four books; Virgil, Eclogues, Georgics, and six books of the *Æneid*; Cicero, six orations; Greek Grammar, including prosody; Xenophon's *Anabasis*, four books; Homer's *Illiad*, two books (omitting the catalogue). For the *Anabasis* equivalents will be accepted from Goodwin's Greek Reader.

Candidates will also be examined in the first forty-five pages of Allen & Greenough's Latin Composition, and in Jones' Greek Composition, or in their equivalents; also, in Greek and Roman History.

(2) *Literary Course*.—Candidates must pass a satisfactory examination in Higher Arithmetic; Algebra, to Quadratic Equations; Geometry, first four books (Davies' Legendre or Loomis'); English Grammar; Rhetoric; Geography; History of the United States; in the Latin Grammar and Reader; four books of Cæsar; and in Greek and Roman History. It is desirable, also, to possess an elementary acquaintance with some modern language. As a test of proficiency in practical grammar and composition, each applicant will be required to write a short English exercise, which he must be able to analyze and parse.

By the term Rhetoric is meant the study of Rhetoric and Practical Composition as commonly treated in such elementary text-books as Hart's "Manual of Composition and Rhetoric," covering such subjects as Punctuation, Diction, the Properties of Style, Figures of Speech, Versification, and especially the practice of Prose Composition.

The knowledge required of Ancient History is such as may be obtained from Smith's "Smaller History of Greece," and "Smaller History of Rome."

#### THE CLASSICAL COURSE.

In Latin, the grammars of Allen & Greenough and of Harkness are used, with references to Madvig's. The first-named is recommended to beginners. Hadley's Greek Grammar and Goodwin's Greek Grammar are used. The latter is recommended to preparatory classes. Liddell & Scott's Greek Lexicon and Andrews' or White's Latin Lexicon are also recommended.

All the instruction in Latin and Greek aims to bring out the relations of those languages to our own.

Prominence is given in the classical course to such works preceptive or illustrative, as bear on the art of public speaking.

Latin and Greek prose composition receive attention during the first two years.

## SCHEDULE OF STUDIES.

### FOURTH, OR FRESHMAN CLASS.

*First Term.*—Latin—Livy (one Book); Cicero, De Senectute; Latin Composition; Greek—Homer, Odyssey; Herodotus; Xenophon; Memorabilia; Mathematics—Algebra; Rhetoric; Written Translations; Geography of the Roman Empire—Lectures; Spanish and Hebrew—(Optional through the course).

*Second Term.*—Latin—Horace, Odes, Epistles, and Ars Poetica; Latin Composition; Greek—Plato, Phædo; Demosthenes; Third Olynthiac; Thucydides; Mathematics—Algebra, completed; Geometry; English Language—Hadley; English Composition.

### THIRD, OR SOPHOMORE CLASS.

*First Term.*—Latin—Tacitus, Histories; Pliny, Epistles; Latin Composition; Greek—Plato, Apology and Crito; Greek Composition; French or German; English Language—Earle's Philology; English Composition; Mathematics—Trigonometry, Plane and Spherical; Analytical Geometry; Roman Archæology—Lectures.

*Second Term.*—Latin—Terence, Andria; Plautus, Captives; Greek—Æschylus, Prometheus; Euripides, Alcestis; French or German; History; English Composition; Mathematics—Analytical Geometry; Surveying.

### SECOND, OR JUNIOR YEAR.

*First Term.*—Latin—Cicero and Quintilian, in Kellogg's "Ars Oratoria;" Greek—Sophocles, Antigone; Lysias, Select Orations; French or German; History of English Literature—(Elective); English Composition—(Elective); History; Anglo-Saxon—(Elective); Zoology—(Elective); Chemistry—Lectures; Grecian Antiquities—Lectures—(Elective).

*Second Term.*—Latin—Juvenal; Horace, Satires; Greek—Plato, Gorgias; French or German; History of English Literature—(Elective); English Composition—(Elective); History—(Elective); Anglo-Saxon—(Elective); Physics; Zoology—(Elective); Roman Literature—Lectures—(Elective); Grecian Antiquities—Lectures—(Elective).

### FIRST, OR SENIOR CLASS.

*First Term.*—Latin—Cicero, Pro Cluentio, or Tusculan Disputations—(Elective); Greek—Demosthenes, Oration on the Crown—(Elective); French or German—(Elective); English—Select Prose—(Elective); English Composition—(Elective); Moral Philosophy—Lectures; Political Economy; Physics; Geology; Astronomy—(Elective); Greek Literature and Philosophy—Lectures—(Elective); Comparative Philology—Lectures—(Elective).

*Second Term.*—Latin—Lucretius; Catullus—(Elective); Greek—Aristophanes, Frogs, Clouds, or Birds—(Elective); German or French—(Elective); Linguistics—Whitney's Language and the Study of Language; English—Select Poetry—(Elective); English Composition—(Elective); Political Economy—Lectures and Discussions—(Elective); Physics; Geology; Greek Law and Politics—Lectures—(Elective); Thesis—(Preparatory to graduation).

## THE LITERARY COURSE.

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*Terms of Admission.*—These are stated on a previous page.

### SCHEDULE OF STUDIES.

#### FOURTH, OR FRESHMAN CLASS.

*First Term.*—Rhetoric; Composition—Descriptive, Narrative; Mathematics—Algebra; French or German—(Begun); Latin; The Culture of the Intellect—Lectures; Geography of the Roman Empire—Lectures; Spanish and Hebrew—(Optional through the course).

*Second Term.*—Logic; Composition—Exposition, Argument; Mathematics—Algebra; Geometry; French or German; Latin; Lectures on Books.

#### THIRD, OR SOPHOMORE CLASS.

*First Term.*—English Language and Literature—Study of Masterpieces; Composition—Exposition and Argument, Imaginative, etc.; Mathematics—Trigonometry, Plane and Spherical; French; German; Latin; Chemistry—Lectures and Laboratory; Library Work, with Lectures.

*Second Term.*—Composition—Account of books read; Historical Investigation, etc.; Style—Abbott's "How to Write Clearly;" History; Mathematics—Analytical Geometry; Surveying; French; German; Latin; Chemistry.

#### SECOND, OR JUNIOR CLASS.

*First Term.*—Anglo-Saxon Grammar (Elective); History of English Literature; Composition—Literary Studies; Sketches, Prose or Verse, etc.—(Elective); History; German—(Elective); French—(Elective); Latin—(Elective); Chemistry—(Elective); Zoölogy.

*Second Term.*—Anglo-Saxon and Early English Literature—(Elective); History of English Literature; Composition—Character Studies; Literary Criticisms, etc.—(Elective); History—(Elective); German—(Elective); French—(Elective); Latin—(Elective); Zoölogy; Physics; Grecian Antiquities—Lectures—(Elective.)

#### FIRST, OR SENIOR CLASS.

*First Term.*—English—Select Prose—(Elective); Composition—Special Investigations: Political, Æsthetic, Philosophical—(Elective); Comparative Philology—Lectures—(Elective); Political Economy; Moral Philosophy—Lectures; German—Select authors—(Elective); French—Select authors—(Elective); Astronomy (Elective); Geology; Physics.

*Second Term.*—English—Select Poetry—(Elective); Composition—Philosophical, Literary, Oratorical—(Elective); Political Economy—Lectures and discussions; Linguistics—Whitney's "Language and Study of Language;" German—Select authors; History of Literature—(Elective); French—Select authors; History of Literature—(Elective); Physics; Geology; Thesis—(Preparatory to graduation).



# COLLEGE OF MEDICINE.

## FACULTY.

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*President.*

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*Dean and Professor of Obstetrics and Clinical Diseases of Women.*

C. M. BATES, M. D.,

*Professor of Clinical Medicine and Physical Diagnosis.*

M. W. FISH, M. D.,

*Professor of Physiology.*

JAMES SIMPSON, M. D.,

*Professor of Materia Medica, Therapeutics, and Clinical Medicine.*

F. W. HATCH, A. M., M. D.,

*Professor of Public Hygiene.*

N. J. MARTINACHE, M. D.,

*Professor of Ophthalmology and Otology.*

G. A. SHURTLEFF, M. D.,

*Professor of Mental Diseases and Medical Jurisprudence.*

ROBERT A. McLEAN, M. D.,

*Professor of Principles of Surgery and Clinical Surgery.*

A. W. PERRY, M. D.,

*Professor of Chemistry.*

WILLIAM LEWITT, M. D.,

*Professor of Anatomy.*

W. F. McNUTT, M. D., F. R. C. S., Edinburgh.

*Professor of Theory and Practice of Medicine.*

H. FERRER, M. D.,

*Professor of Pathology and Microscopy.*

W. H. MAYS, M. D.,

*Assistant to the Chair of Obstetrics and Gynecology.*

WILLIAM B. LEWITT, M. D.,

*Demonstrator of Anatomy.*

R. BEVERLY COLE, M. D.,

*Dean, 518 Sutter Street, San Francisco.*

R. A. McLEAN, M. D.,

*Secretary, 603 Merchant Street, San Francisco.*

## STUDENTS.

NAME.	RESIDENCE.
Walter E. Bates	Oakland.
F. A. Bettelheim	San Francisco.
A. F. Benzon	Oakland.
B. H. Baumeister	Walla Walla, Washington Territory.
E. D. Buckley	Sacramento.
V. P. Buckley	San Francisco.
L. S. Burchard	Oakland.
R. I. Bromley	Oakland.
H. H. Caldwell	San José.
W. L. Chapman	Portland, Oregon.
Charles Clinton	San Francisco.
Andrew Dean	San Francisco.
C. T. Dean	San Francisco.
A. DePuy	Santa Cruz.
C. W. Evans	Modesto.
J. F. Foulkes, Jr.	Oakland.
Frank Gates	San Francisco.
E. L. Grattan	San Francisco.
G. W. Gilham	Island City, Oregon.
T. P. Hopkins	San Francisco.
Horace Laidlaw	Oakland.
J. P. LeFevre	San Francisco.
Franklin A. Lord	San Francisco.
R. W. Martin	Oakland.
R. C. Mayers	San Francisco.
James Mathewson	Oakland.
G. W. Merritt	San José.
H. Mueller	Fruit Vale.
H. Munter	Stockton.
F. E. Morgan	Santa Cruz.
Marg. Moody	San Francisco.
W. H. Olds	Walla Walla, Washington Territory.
J. R. Payne	San Francisco.
T. J. Patterson	Santa Rosa.
H. M. Pond	San Francisco.
J. B. Pressley	Santa Rosa.
T. C. Park	San Francisco.
F. B. Riardan	Oroville.
J. W. Robertson	San Francisco.
L. A. Sabey	San Francisco.
W. C. Sawyer	San Francisco.
A. Sallon	San Francisco.
E. S. Senter	San José.
John Sheets	Phoenix, Arizona Territory.
S. D. Sheppard	Visalia.
E. Shepard	Santa Cruz.
J. Stanton	San Francisco.
Emma Sutro	Nevada County.
A. P. Tarter	Tehama.
— Wickman,	San Francisco.
J. D. Young	Stockton.
J. M. Young	Oakland.

Total

52.

## ANNOUNCEMENT.

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The Medical Department of the University of California is located in the metropolis; the necessary advantages for clinical teaching being only fully found in a large city.

The College building, a large brick and stone edifice, is situated on Stockton street, North Beach, convenient to the termini of two of the principal car routes. The College, known as Toland Hall, is replete with all the apparatus and appointments required in imparting a thorough medical education.

### THE COLLEGIATE YEAR.

The Collegiate Year in this institution is divided into two sessions: a Preliminary Spring Term, and a Regular Summer Session.

The Preliminary Term commences February first and ends about the middle of May. During this term subjects are dwelt upon that do not receive their full meed of attention during the Regular term. Clinical lectures proceed at the Hospital and College as during the Regular term. The Chemical Laboratory and Dissecting room are open for practical work. Students are expected to attend this preliminary course, although such attendance is not compulsory.

The Regular Term commences June first, and end in the second week of November. During this term all the branches of medicine and surgery are taught didactically and clinically. Regular clinics are held three days in the week at the City and County Hospital, where the Professors of the practical chairs have charge of wards and possess every advantage for the instruction of students. There is also an active clinic conducted twice a week at the College building, where a large number of patients are examined and treated before the classes. Didactic lectures are given daily by the Professors, and evening recitations are held three times a week.

### PLAN OF INSTRUCTION.

The almost paramount importance now assigned to *clinical teaching* has been fully met in the curriculum of this school. While didactic teaching has not been overshadowed or neglected, the Faculty have made strenuous efforts to secure the most comprehensive clinical facilities the city affords, believing that a proper blending of the two methods of instruction will best insure the end and aim of the institution, viz.: the sending forth of skilled, practical physicians.

The plan pursued by the several clinical professors has for its aim the actual confronting of the student with the phenomena of disease, that the senses of sight, hearing, and touch may be trained to aid in forming a correct diagnosis. The method of imparting and educating knowledge is at once attractive and thorough, consisting of questions and answers on each patient examined, discussions on the plans of treatment proposed, and the examination of new cases by each senior student in rotation, in presence of the class.

## HOSPITALS.

The provisions for the pursuit of bedside study are perhaps unsurpassed anywhere. They are briefly as follows:

**CITY AND COUNTY HOSPITAL.**—This is the largest hospital on the Pacific Coast, containing nearly five hundred beds. The Faculty of the Medical Department of the University is well represented in its corps of physicians. Three of the surgical wards are under the charge of Professor McLean. Professor Bates conducts the general medical clinic, Professor Martinache the clinic of Ophthalmology, Otology, and Laryngology. Each of these gentlemen holds clinics three times a week. The gynecologist of the hospital, Professor Beverly Cole, holds an obstetrical and gynecological clinic twice a week. Autopsies are made every other day under the direction of Dr. H. Ferrer, who instructs the class in the art of making post-mortems, and demonstrates pathological conditions by the aid of the microscope. Surgical operations of the more important kind are performed in the newly erected operating theater, a circular building, capable of seating two hundred and fifty students. Operating days, Tuesday and Saturday. The hospital is situated at the junction of Twenty-second street with Potrero Avenue.

**CITY RECEIVING HOSPITAL.**—This municipal institution, occupying part of the old City Hall, is the general receiving depot for accidents and casualties occurring on the streets of the city. Upwards of one thousand cases were received during last year. It is under the charge of Dr. C. Black, City Physician, and Dr. C. Stivers, Police Surgeon, the latter an alumnus of this school. These gentlemen courteously permit students to visit the wards daily, to be present at operations, assist at dressings, etc.

**SAN FRANCISCO FEMALE HOSPITAL, CLAY STREET.**—Dr. Hutchins, Surgeon-in-Chief of this hospital, kindly assigns cases of obstetrics to the senior students of the school, and assists them as far as possible to gain a knowledge of the conduct and management of child-birth.

**COUNTY JAIL AND BRANCH JAIL.**—The medical service of these institutions is, through the kindness of Dr. Black, open to the attendance of our students, who will be welcomed by the physicians in their rounds, and the various conditions and treatment explained.

## PRACTICAL ANATOMY.

The dissecting-room, provided with every modern convenience, is open all the year for such as are prosecuting the study of practical anatomy. Material is abundant and cheap, and every facility is furnished the student.

## DIDACTIC INSTRUCTION.

That part of the educational course which belongs to the lecture-room, known as didactic, is sustained by a corps of medical lecturers of large experience and eminent ability. Lectures, to the number of

five or six per diem, are given either in the amphitheater or the large lecture-hall of the College, on days alternating with hospital clinic days.

The professor of *Surgery* devotes to this important chair all the attention it demands, illustrating on the cadaver and by wet and dry preparations the various procedures, abnormal conditions, and operations.

In the department of *Obstetrics* the professor imparts a thorough acquaintance with the conduct of labor, normal, and abnormal, the diagnosis symptoms and disorders of the pregnant and puerperal state, and the use of obstetrical instruments. The lectures are illustrated by the manikin, by wet preparations, by colored drawings, and by a large collection of preparations in wax, papier-maché, and leather. Every operation in obstetrics is performed on the female cadaver.

It is the aim of the professor of *Materia Medica* to bring before the class, in a manner readily comprehended, all that is of importance in this department. Recently discovered drugs and plants, particularly those indigenous to our soil, receive special attention.

The lectures in *Physiology* are illustrated by a very complete series of colored drawings prepared for this purpose. The professor also has at his command the large collection of preparations and drawings of the Scientific Department of the State University at Berkeley.

The course in *Chemistry* is made as practical and instructive as possible. The laboratory is rendered complete by constant additions of apparatus and chemicals.

The professor of *Theory and Practice of Medicine*, fully realizing the importance of this chair to the student, presents a conspectus of the modern aspect of the practice of medicine. Disease, as we now understand and treat it, its etiology, diagnosis, prognosis, and treatment, is the object of the instructor in this department.

The lectures on Anatomy, general, special, regional, and surgical, are illustrated by wet and dry preparations and the cadaver. The histology of every tissue is taught, and the relation of organs and structures to each other carefully dwelt upon.

The lectures on *Medical Jurisprudence and Mental Diseases* are by the Superintending Physician of the State Lunatic Asylum. They exhibit the principles of legal medicine and the duties of medical men as experts in Courts of justice, the examination of medico-legal questions, including insanity, suicide, infanticide, legitimacy, poisoning, death, injury from violence, feigned sickness, duties of coroners; together with a thorough course on the various diseases of the mind.

The course on *Public Hygiene* is a most interesting one, covering the whole subject of the duties of individuals and municipalities in the preservation of the public health.

The principles of *Gynecology* receive a share of attention commensurate with the growing importance of this branch of the science. The causes, remote and proximate, of the many forms of uterine disease are considered in detail, and the methods of treatment practically exhibited and explained.

An idea of the course of study pursued in the Medical Department may be gathered from the following schedule, which presents each day's study as conducted during the recent regular term:

## SCHEDULE OF STUDIES.

MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	SATURDAY.
8 A. M.—Lecture. Prof. McLean.	8 A. M.—Hosp. Clinic. Dr. Ferrer.	8 A. M.—Lecture. Prof. McLean.	8 A. M.—Hosp. Clinic. Dr. Ferrer.	8 A. M.—Lecture. Prof. McLean.	8 A. M.—Hosp. Clinic. Dr. Ferrer.
9 A. M.—Lecture. Prof. McNutt.	9 A. M.—Hosp. Clinic. Prof. Bates.	9 A. M.—Lecture. Prof. McNutt.	9 A. M.—Hosp. Clinic. Prof. Bates.	9 A. M.—Lecture. Prof. McNutt.	9 A. M.—Hosp. Clinic. Prof. Bates.
10 A. M.—Lecture. Prof. Cole.	10 A. M.—Hosp. Clinic. Prof. Martinache.	10 A. M.—Lecture. Prof. Cole.	10 A. M.—Hosp. Clinic. Prof. Cole.	10 A. M.—Lecture. Prof. Cole.	10 A. M.—Hosp. Clinic. Prof. Martinache.
11 A. M.—Lecture. Prof. Simpson.	11 A. M.—Hosp. Clinic. Prof. McLean.	11 A. M.—Lecture. Prof. Simpson.	11 A. M.—Hosp. Clinic. Prof. McLean.	11 A. M.—Lecture. Prof. Simpson.	11 A. M.—Hosp. Clinic. Prof. McLean.
1:30 P. M.—College Clinic. Dr. Mays.			1:30 P. M.—College Clinic. Dr. Mays.		
2 P. M.—College Clinic. Profs. Perry and McLean.	2 P. M. Laboratory Work.	2 P. M.—Lecture. Prof. Shurtleff.	2 P. M.—College Clinic. Profs. Perry and McLean.	2 P. M.—Lecture. Prof. Hatch.	
3 P. M.—Lecture. Prof. Fish.	3 P. M.—Lecture. Prof. Perry.	3 P. M.—Lecture. Prof. Fish.	3 P. M.—Lecture. Prof. Perry.	3 P. M.—Lecture. Prof. Fish.	
4 P. M.—Lecture. Prof. Lewitt.		4 P. M.—Lecture. Prof. Lewitt.		4 P. M.—Lecture. Prof. Lewitt.	
7 P. M.—Recitation. Prof. Lewitt.		7 P. M.—Recitation. Prof. McLean.			7 P. M.—Recitation. Prof. McNutt.

## THE HIGHER STANDARD OF EDUCATION.

The question of establishing a higher standard of requirements for graduation has for some years occupied a prominent place in the thoughts of all interested in medical education. It is with pride that it can be said that the Medical Department of this University was among the first schools of America to adopt an improved and higher system of study and requirements. A three-years' course of regular medical study is an indispensable qualification for graduation. No student can present himself for final examination until he has attended faithfully three regular courses of lectures and clinics. While this requirement entails no extra expense in the matter of fees, it is a still further guarantee that none shall bear the diploma of the State Medical School but those thoroughly qualified.

The system of GRADED STUDIES and YEARLY EXAMINATIONS has also been introduced, in uniformity with the Howard plan, and now generally adopted by the higher class of eastern medical colleges. The studies are so graded as to allow the constant introduction of new matter as the student progresses, and at the same time to secure at least as much repetition of the more essential subjects as in the former system of teaching.

An examination is held at the close of each regular term on the advancement made by the student in the branches assigned. The final or graduation examination, however, comprises the whole field of medicine. The union of clinical with didactic teaching, a leading principle of this school, is not interfered with in the working of this plan.

The subjects for examination are apportioned as follows:

### FIRST YEAR.

Anatomy, Physiology, General Chemistry, and Materia Medica.

### SECOND YEAR.

Anatomy, Physiology, Medical Chemistry, Materia Medica, Pathological Anatomy and Histology, Clinical Medicine, Physical Diagnosis, and Clinical Surgery.

### THIRD YEAR.

Anatomy, General and Surgical, Physiology, Chemistry, Materia Medica and Therapeutics, Obstetrics, Theory and Practice of Medicine, Surgery, Clinical Medicine, Physical Diagnosis, Clinical Surgery, Gynecology, Ophthalmology, Mental Diseases, Medical Jurisprudence, Public Hygiene, and Laryngoscopy.

## RULES AND REQUIREMENTS FOR GRADUATION.

I. The candidate for the degree of Doctor of Medicine must have attained the age of twenty-one years, and be of good moral character. He must have applied himself to the study of medicine for three years, must have attended three regular courses of medical lectures, and have attended at least his last course of instruction in this school; have prepared a satisfactory thesis of his own composition, and in his own handwriting, which must be submitted prior to his admission to examination.

II. Students who have attended one full course in any regular or recognized Medical College shall, upon satisfactory examination in the curriculum provided for the first year, be admitted as students of the *second course* in the University of California. Students who have attended two courses in any regular and recognized Medical College shall be admitted as students of the *third course* in this Institution, after having passed a satisfactory examination in the curriculum provided for the second year. Graduates of other regular Medical Colleges, in good standing, shall be admitted as students of the *third course* in this Institution without any examination.

III. When a candidate applies to the Secretary of the Faculty for examination, he must give satisfactory evidence that the above rules have been complied with, which evidence will be presented by the Secretary to the Dean, by whom an order for examination will be issued.

IV. The candidate will pay the graduation fee on the presentation of the thesis to the Secretary, and upon receiving notice of having passed a satisfactory examination, he will enter his name on the Register for the purpose of being reported to the Board of Regents.

V. Candidates who have passed their examination, and in other respects complied with the regulations, are reported by the Secretary of the Faculty to the Dean of the University, who communicates such report to the Board of Regents, so that, if approved of by them, their order may be issued for conferring the Degree.

VI. The Commencement for conferring the Degree of Doctor of Medicine is held in the first week of November.

VII. For the convenience of such candidates as have, at the close of the term, not completed their full three years of study, and have complied with every other requirement, an examination will be held in the month of May, and the Degree will be conferred upon such as are successful at the next regular Commencement. A certificate will be given, however, setting forth the facts in the case, which will be recognized by the State Board of Examiners, and a license to practice granted by them.

VIII. In accordance with the organic Act under which the University was incorporated, the Faculty will examine all candidates, whether educated in the University or in other schools. Such as come from other Colleges must have been examined by the Faculty of said College, and recommended by them as proficient candidates for the Degree. On passing the examination in the University, they may receive the Degree and Diploma, and rank as graduates of this Institution.

#### EXPENSES.

Matriculating fee (paid but once).....	\$5 00
Fee for the First Course of Lectures.....	130 00
Fee for the Second Course of Lectures.....	130 00
Third Course of Lectures gratuitous for such as have paid for two full courses.	
Graduating fee.....	40 00

NOTE.—All fees are payable in advance to the Secretary of the Faculty, who will issue a general ticket to all the lectures. No promissory notes will be received, but such students as desire may obtain tickets for one or any number of the chairs separately.



## BOOKS OF REFERENCE.

*Anatomy*—Gray's Anatomy, Wilson's Anatomy, Richardson's Anatomy.

*Physiology*—Dalton's Physiology, Draper's Human Physiology, Flint's Physiology.

*Chemistry*—Fowne's Chemistry, by Bridges.

*Materia Medica*—H. C. Wood's Therapeutics, Materia Medica, and Toxicology, Farquarson's Materia Medica, United States Dispensatory.

*Surgery*—Erichsen's Science and Art of Surgery, Gröss' System of Surgery, H. H. Smith's Operative Surgery, Toland's Lectures on Practical Surgery.

*Principles and Practice of Medicine*—Aitken's Practice of Medicine, Bennett's Practice of Medicine, Tanner's Practice of Medicine.

*Clinical Medicine*—Tanner's Clinical Medicine, DaCosta's Medical Diagnosis, Loomis' Physical Diagnosis.

*Obstetrics and Diseases of Women and Children*—Bedford's Principles and Practice of Obstetrics, Scanzoni's Diseases of Women, Thomas' Diseases of Women, Sims' Uterine Surgery, Simpson's Diseases of Women, West on Diseases of Children, Smith's Diseases of Children.

*Ophthalmology and Otology*—Troelsch on the Ear, Wells on Diseases of the Eye, Donders on Refraction and Accommodation.

*Medical Jurisprudence and Mental Diseases*—Maudsley's Physiology and Pathology of the Brain, Bucknell and Tude on Insanity, Taylor's Medical Jurisprudence.

## BOARDING.

Students may obtain good board in San Francisco at from *five to ten* dollars per week, and if they desire, may live at a less expense.

N. B.—Students, on arriving in the city, should call at once upon the Secretary, Professor R. A. McLean, 603 Merchant street, or the Dean, Professor R. Beverly Cole, 518 Sutter street, who will furnish all necessary information.

Letters must be addressed to the Secretary, at his office.

# CALIFORNIA COLLEGE OF PHARMACY.

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## COLLEGE OF PHARMACY.

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## FACULTY.

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JOHN LeCONTE, M. D.,  
*President.*

WILLIAM T. WENZELL,  
*Professor of Chemistry.*

W. M. SEARBY,  
*Professor of Materia Medica.*

HERMANN BEHR, M. D.,  
*Professor of Botany.*

EMLEN PAINTER,  
*Professor of Pharmacy, and Dean of Faculty.*

## STUDENTS.

Argenti, Jerome J. B.	Gove, David M.	McCarthy, William D.
Adair, William H.	Grazer, Frederick	Newland, Mrs. Ruth E.
Allen, Charles H.	Heppersberger, Emil	Oberdeemer, Samuel
Barrington, Chas. L.	Hammit, Charles H.	Peters, William J.
Bellman, Vincent	Hurtzig, William F. N.	Pond, Olive M.
Bates, Horace G.	Hulting, Frederick B.	Perry, John W. S.
Barbat, John H.	Hasenbalg, William	Pratt, H. C.
Bush, C. G.	Hoysholt, W. A.	Rowan, James E.
Beardsley, Geo. F.	Holmes, A. O.	Schwartzman, Max
Byrd, William H.	Jones, Clarence F.	Schellhaas, Nicholas
Crane, Charles W.	Johnson, R. D.	Searby, Frederick W.
Cody, Nelson L. A.	Lippincott, Frank A.	Scholl, Albert L.
Chard, George R.	Lustig, D. D.	Shaner, J. J.
DeWitt, James M.	Lindsay, Frederick G.	Taylor, Alonzo A.
Dubois, Paul A.	Leffler, Ruluff C.	Thurston, R. M.
Elwert, Charles P.	Lengfeld, Felix	Troppman, Charles M.
Evans, Thomas A.	Lezynsky, Samuel L.	Tryon, James W.
Fletcher, David	Long, W. A.	Wappel, George
Fevrier, John P.	Lynch, W. F.	Wight, David
Freeman, Mary E.	Moore, Mrs. Ellen D.	Williams, Robert B.
Frisbie, E. G.	Murphy, Martin J.	Young, Wilfred M.
Field, Edna E.	McLaughlin, John R.	
Foss, Henry	Morrison, Williams P.	
Total		67.

## SCHOOL OF PHARMACY.

## IMPORTANT NOTICE.

The Trustees invite the attention of all persons engaged in the drug business on the Pacific Coast to the following announcement of the lecture course for the approaching session:

In no other part of the United States is there such need of the advantages which this College supplies. The long hours of business prevalent here, the frequent changes in the management of our various establishments, combined with other causes well known to every apothecary, render it difficult for employers to give systematic instruction to their assistants and apprentices in the various branches of science with which they ought to be familiar. This instruction the College provides, and the Trustees hope that employers will afford their assistants the requisite time to attend the lectures, as well as a short time every day for study.

The Trustees would also urge young men who may have entered the drug business without a liberal education, to lose no time in making up this deficiency. In addition to a good English education, they should at least know enough of Latin to enable them to read prescriptions and pharmacopœias with readiness and accuracy.

Attention is directed to the time of commencing the lectures, and also to the fact that there will be six lectures each week instead of five. This, it is believed, will be an advantage to the students which will be duly appreciated.

## MINOR EXAMINATION.

Between the close of the session of 1880 and the opening of that of 1881, the first-year students will be required to present themselves for examination before entering on their second course, and those who neglect to comply with this regulation will be debarred from presenting themselves for graduation at the close of the term.

## PRIZES.

Two or more prizes will be given at the close of the lecture term to the students passing the best examinations. One of these, presented by Mr. William Geary, will be a set of reagents and blowpipe; and another, the gift of Mr. Carl Zeile, will consist of books to the value of twenty dollars, or the coin, as the recipient may elect.

## THE LECTURES

Are delivered in the hall of the Academy of Science, corner of Dupont and California streets, on Tuesday, Thursday, and Saturday evenings, with daylight demonstrations in Botany on Mondays, from 11:30 A. M. to 12:30 P. M.; commencing Thursday, May 28th, and terminating about the end of October. The lectures opened with a much larger class than at any time before. There were eighty-eight matriculants; twenty-eight of these, however, were medical students, and one received a complimentary ticket to the Course of Chemistry. The remaining fifty-nine were regular students in Pharmacy; of these forty were first course students, and nineteen had already attended one or more courses.

## CHEMISTRY.

The lectures will be delivered on Tuesday and Saturday of each week at 7:30 P. M.

This course will present a systematic study of theoretical chemistry, according to the latest views of chemical philosophers.

Physics will be dwelt upon sufficiently for the illustration of the general properties of matter—the forces of gravitation, adhesion, and cohesion.

Caloric, in its relation to chemistry, will be treated of.

This will be followed by the laws of chemical affinity, the electrochemical theory, symbols, nomenclature, and the laws of chemical combination.

A full and concise course of the chemistry of the non-metallic and metallic bodies is next taken up, comprising the more important elements, and those of special interest to the pharmacal student.

The course to conclude with organic chemistry, in which the chemistry of the alcohols, ethers, organic acids, sugars, glucose, gums, starch, glucosides, alkaloids, etc., will receive their due share of attention.

## MATERIA MEDICA.

The lectures will be delivered at 8:30 P. M. every other lecture night, alternating with the lectures on Pharmacy.

The lectures on Materia Medica are devoted to those substances, chiefly of vegetable origin, which are used in medicine, and which are included under the general designation of drugs.

These articles are studied in a systematic manner, notice being taken of the sources from which they are derived, their natural and commercial history, principal constituents, and remedial qualities. The ordinary and toxic doses, with antidotes to the latter, receive careful consideration.

The students are instructed as to the proper time for collecting the various vegetable products, as well as the best modes of preserving them. Attention is called to their physical properties, as met with in trade, and to the leading characteristics of each drug. Substitutions, adulterations, and natural impurities, with the methods of detecting the same, are duly considered, as also the distinguishing features observed in articles of superior and inferior quality. The use of the microscope is shown as a means of identifying different drugs, and of detecting adulterations.

#### PHARMACY.

The lectures will be delivered at 8:30 p. m. every other lecture night, alternating with the lectures on *Materia Medica*.

The introductory lectures to this course embrace the art of weighing and measuring; definitions of the systems of weights and measures in use, and authorized by the United States, British, French, and German Pharmacopœias; the theory and practice of obtaining the specific gravity of liquids and solids. A description of the apparatus necessary to the proper conduct of the business of the Pharmacist, and the purposes to which they are applied—such as comminution, solution, filtration, neutralization, precipitation, crystallization, and the management of heat in its application to the processes of evaporation, distillation, sublimation, calcination, etc., will be embraced in the regular course, in which the preparations and products, official in the United States and other Pharmacopœias, together with such non-official preparations as may merit attention, will be considered.

It being impossible to consider each individual process minutely, it will be the chief aim to thoroughly elucidate those processes that are types of others; referring to the typical process whenever it can be done without depriving the student of valuable information, and drawing attention to any peculiarity or reason for modifying or deviating from the type.

By this method of instruction, it is believed, the student will acquire a comprehensive knowledge of his profession, and will readily find similarity between substances that are, physically, entirely different. Manufacturing and Extemporaneous Pharmacy will receive their full share of attention; and those processes that can be conveniently carried out by the Pharmacist will be minutely dwelt upon. The adulterations and sophistications, to which the official preparations are subject, and the methods of their detection, will be noticed to the extent their importance may demand.

#### BOTANY.

The lectures will be delivered on Thursday evening of each week, at 7.30 o'clock.

The lectures include structural, functional, and systematic botany and the geography of plants. In addition to these weekly lectures, excursions will be made into the country on alternate weeks during

the session, for the purpose of collecting and studying indigenous plants, under the direction of the professor.

Daylight demonstrations will be given every alternate Monday, at 11.30 A. M., and students are urged to make arrangements to attend as regularly as possible.

#### CONDITION OF GRADUATION.

1. The candidate must be of good moral character, and have attained the age of twenty-one years.

2. He must have attended two full courses of lectures given by this College, or one of those given by some other College of Pharmacy, whose conditions of graduation are based upon the like term of service, and the final course in this College. After this session no candidate will be permitted to present himself for examination as Graduate, who has not previously passed the Minor Examination. (See notice, p. 28.)

3. At the time of the final examination for the degree of Graduate in Pharmacy, the candidate must have had at least three and a half years' practical experience; but he shall not receive his diploma until he shall have completed the term of four years' service.

4. Candidates for graduation will be subjected to a written, oral, and practical examination.

a. The examination will embrace questions in Theoretical and Pharmaceutical Chemistry, Botany, Pharmacognosy, and Materia Medica, a knowledge of the U. S. Pharmacopœia, of the various systems of weights and measures, of the maximum doses of powerful remedial agents, of the antidotes for poisons, and the translation of Latin prescriptions.

b. The practical examination will comprise the analysis as to identity and purity of simple medicinal chemicals, the actual compounding of prescriptions requiring skill and judgment, the identification of specimens in the several departments, and the making of Chemical and Pharmaceutical preparations.

5. No special examination for graduation will be held, but only one examination at the end of the regular course.

6. Each candidate must present an original thesis, written in English, in his own handwriting, and also pass his examination in English.

7. He must be recommended jointly by the Professors and the Examining Board, which recommendation will be acted upon by the Regents of the University of California, by whom the degree is conferred (the College of Pharmacy being affiliated with the University).

8. Any student who has not had the full three and a half years' service here referred to, but who has complied with all the other conditions of graduation, may present himself for examination, and should he receive the requisite number of credits, will be awarded a "Certificate of Proficiency," upon which he will afterwards be entitled to a Diploma, on producing evidence of having completed the four years' practical experience.

#### FEES.

Lecture Tickets (for the Season)-----	\$50 00
Matriculation Ticket-----	2 50
Diploma Fee-----	10 00

The matriculation and lecture tickets must be taken out by each student in person, and must be indorsed, the former within fifteen and the latter within thirty days from the beginning of the lecture course.

Members and graduates of the College, and students who have attended two sessions in the College, are admitted free to the lectures. Students in any of the departments of the University of California and in the Medical College of the Pacific will be admitted to the lectures free by matriculating and paying only for the matriculation ticket. Medical students, or others, not intending to pursue pharmacy as their vocation, will be admitted to the lectures, or any one of the courses they may desire to attend, by paying the matriculation fee and that of the chair or chairs of instruction; and such students will enjoy the same advantages as regular students of pharmacy, except that they will not be eligible to the degree of Graduate in Pharmacy.

#### CLERKS AND STUDENTS.

Drug Clerks and students on coming to the city, and those out of employment here, who are desirous of obtaining situations, may call on the Dean of the Faculty and register their names.

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### GRADUATES.

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1879.

G. G. Burnett.  
James McL. Mathewson.  
Emil C. Mervy.  
Louis P. Messing.

George W. Minor.  
Arthur H. H. Smith.  
Adolph Sommer.  
Phrauk L. Vreeland.

# HASTINGS COLLEGE OF THE LAW.

## DIRECTORS.

HON. R. F. MORRISON .....	SAN FRANCISCO.
<i>Chief Justice, President of Board.</i>	
COLONEL J. P. HOGE .....	SAN FRANCISCO.
<i>Vice-President.</i>	
HON. W. W. COPE .....	SAN FRANCISCO.
HON. DELOS LAKE .....	SAN FRANCISCO.
HON. J. R. SHARPSTEIN .....	SAN FRANCISCO.
HON. O. P. EVANS .....	SAN FRANCISCO.
S. M. WILSON, Esq. ....	SAN FRANCISCO.
THOMAS B. BISHOP, Esq. ....	SAN FRANCISCO.
THOMAS I. BERGIN, Esq. ....	SAN FRANCISCO.

## FACULTY.

JOHN LECONTE, LL.D.,  
*President.*

JOHN NORTON POMEROY, LL.D.,  
*Professor of Municipal Law.*

OLIVER P. ETANS, LL.B.,  
*Adjutant Professor.*

WILLIAM H. PLATT, D. D., LL.D.,  
*Professor of Ethics and Rules of Morality.*

S. CLINTON HASTINGS,  
*Dean, and Professor of Comparative Jurisprudence.*

CHARLES P. HASTINGS, B.S.,  
*Registrar.*



## STUDENTS.

## SENIOR CLASS.

NAME.	Residence.
Charles S. Andrews, A. B. (Bdn.)	San Francisco.
Charles R. Barry, B. S. (S. C.)	San Francisco.
J. I. Boland	San Francisco.
Earnest Brand	San Francisco.
Wallace O. Currier	San Francisco.
W. R. Daingerfield, A. B. (U. C.)	San Francisco.
A. B. D'Ancona, A. B. (U. C.)	San Francisco.
Frank P. Deering, A. B., A. M. (U. C.)	San Francisco.
J. H. Deering, Jr.	San Francisco.
J. B. de las Casas	Oakland.
Louis F. Dunand	San Francisco.
Peter F. Dunne	San Francisco.
James D. Elms	Berkeley.
E. W. Emerson	San Francisco.
T. F. Graber	Berkeley.
Robert P. Hastings, A. B. (H. U.)	San Francisco.
Alexander Heynemann	San Francisco.
James A. Hall	Watsonville.
J. Walter Knox	Merced.
John M. Lucas	San Francisco.
Fiesco Mandelbaum, A. B. (U. C.)	San Francisco.
F. C. Marshall	San Francisco.
Henry C. McPike	Napa City.
G. H. Mastick	San Francisco.
George D. Metcalf	Oakland.
Leslie F. Miller	San Francisco.
A. F. Morrison, A. B. (U. C.)	San Francisco.
Edward M. Mott	San Francisco.
Charles H. Moore	San Francisco.
Anthony Morganthal	San Francisco.
H. S. Mulford	San Francisco.
James E. Nagle	San Francisco.
F. M. Ostrander	Merced.
C. P. Pomeroy	San Francisco.
Martin Quinlin, B. S. (S. M.)	Bodega Corners.
S. H. Regensberg	San Francisco.
John W. Ryland	San José.
Alfred Sayre	San Francisco.
William T. Sesnon	San Francisco.
Charles S. Silliman	San Francisco.
F. J. Solinsky, Ph. B. (U. C.)	San Francisco.
Edward M. Seaman	San Francisco.
H. J. Stafford	San Francisco.
Wm. F. Stafford	San Francisco.
F. S. Stratton	Oakland.
Gaston Straus	San José.
Calvin F. Summers	San Francisco.
C. L. Tilden	San Francisco.
Alfred Tobin	San Francisco.
Albert V. Touchard	Oakland.
Gustave Touchard, Jr.	Oakland.
F. P. Tuttle	Oakland.
H. D. Tuttle	San Francisco.
W. M. Van Dyke, A. B. (U. C.)	San Francisco.
Ryland B. Wallace, A. B. (U. C.)	San Francisco.
Adair Welcker	Berkeley.
F. R. Whitcomb, A. B. (U. C.)	Berkeley.
J. W. Winans, Jr., A. B. (U. C.)	San Francisco.
Ralph Wood	Oakland.
E. B. Young	San Francisco.
George A. Young	San Francisco.

Total..... 61.

## MIDDLE CLASS.

NAME.	Residence.
H. L. Adams.....	San Francisco.
Frank Angelotti.....	San Rafael.
Marshall H. Arnold.....	Lakeport.
R. P. Ashe.....	San Francisco.
Robert B. Brenham, A. B. (S. C.).....	San Francisco.
E. R. Brooks.....	San Francisco.
Isaac G. Burnett, A. B. (An. Col.).....	San Francisco.
Joseph F. Cavagnaro, M. S. (S. C.).....	San Francisco.
John D. Connelly.....	San Francisco.
E. B. Cutler.....	San Francisco.
Charles E. Davidson.....	Petaluma.
W. W. Davidson, A. B. (Cal. C.).....	San Francisco.
Henry Davis.....	San Francisco.
John M. Dolan, A. B. (St. M.).....	Watsonville.
Marcellus A. Dorn, Ph. B. (U. C.).....	San Francisco.
Edward C. Harrison.....	San Francisco.
Henry C. Hinekle.....	Salinas City.
L. V. Hitchcock.....	Oakland.
L. M. Hoefler.....	San Francisco.
Joseph Hutchinson, Ph. B. (U. C.).....	Oakland.
Edwin G. Knapp, A. B. (U. C.).....	San Francisco.
William W. Knott.....	Oakland.
William D. Lawton.....	San Francisco.
Leonidas Levisce.....	Red Bluff.
John W. Lewis.....	San Rafael.
Henry McCrea.....	Camptonville.
V. C. McMurray, Jr.....	Merced.
G. W. Marks.....	San Francisco.
Mary McHenry, A. B. (U. C.).....	San Francisco.
Frank D. Miller.....	Benicia.
Lansing Mizner, Ph. B. (U. C.).....	San Francisco.
O. F. Meldon.....	San Francisco.
M. F. O'Donoghue.....	Santa Clara.
Elijah Rousseau.....	San Francisco.
H. M. Savage, Ph. B. (U. C.).....	Napa City.
C. A. Shurtleff.....	Cambria.
C. W. Slack, Ph. B. (U. C.).....	San Francisco.
J. Angelo Spinetti.....	San Francisco.
William H. Schooler.....	Hills Ferry.
C. A. Stonesifer.....	San Francisco.
Farren Stranahan.....	San Francisco.
James F. Smith, M. A. (S. C.).....	Alameda.
Robert B. Tappen.....	San Francisco.
Samuel Tevis.....	San Francisco.
N. M. Trezevant, A. B. (Y.).....	San Francisco.
Robert S. Wade.....	San Francisco.
E. H. Wakeman.....	Saint Helena.
John H. Wheeler, Ph. B. (U. C.).....	Petaluma.
F. P. Wickersham.....	University Mound College.
E. B. Williams, B. S. (U. M. C.).....	San Francisco.
M. S. Wilson, A. B. (Y.).....	

Total.....51.

## JUNIOR CLASS.

NAMES.	Residence.
J. B. Banning	Oakland.
W. T. Barton	San Francisco.
C. A. Brant	Wilmington.
H. H. Briggs	San Francisco.
Miss Emma L. Buckhout	San Francisco.
D. Y. Campbell, A. B. (Y.)	San Francisco.
Raphael Citron	San Francisco.
Frank C. Cleary, A. M. (St. I.)	San Francisco.
A. H. Cohen	San Francisco.
E. P. Cummins	San Francisco.
Charles Creighton	San Francisco.
Eugene Del Mar	San Francisco.
G. L. Dornberger	Fruit Vale.
Joseph Dunne, A. M. (St. I.)	San Francisco.
M. S. Eisner, A. B. (U. C.)	San Francisco.
R. M. Fitzgerald	Berkeley.
D. W. Fox, Ph. B. (U. C.)	San Francisco.
H. W. Frazer	San Francisco.
L. W. Fulkerth, B. S. (U. M. C.)	San Francisco.
John D. Gagnon, B. S. (S. C.)	Oakland.
Frank J. Gray	San Francisco.
E. F. Green	San Francisco.
C. E. Gunn	San José.
J. W. Heerdink, B. S. (S. C.)	San Francisco.
F. E. Hesthal	San Francisco.
F. T. Hoberg	San Francisco.
E. B. Holladay	San Francisco.
W. R. Hughes	San Francisco.
Fred. Irwin	San Francisco.
Howard Johnson	San Francisco.
J. P. Kelly	San Francisco.
C. C. Kinsey	San Francisco.
T. J. Lyons	San Francisco.
Daniel Langstadter	San Francisco.
H. N. Latimer	San Francisco.
George Leszynsky	San Francisco.
W. E. Lindenberger	Fruit Vale.
J. H. Loryea	San Francisco.
George H. Maxwell	San Francisco.
D. I. Mahoney, A. B. (S. C.)	San Francisco.
H. W. Mathews	San Francisco.
J. D. McGillivray, A. B. (U. C.)	San Francisco.
C. J. McGovern	San Francisco.
S. B. McKee, Jr., B. S. (S. C.)	Oakland.
F. H. McNally, A. M. (S. C.)	San Francisco.
Henry Miller	Oakland.
T. J. Murray, A. B. (St. M.)	San Francisco.
Orestes J. Oreña, B. S. (S. C.)	San Francisco.
W. T. Phipps	San Francisco.
Mark J. Platshek, A. B. (U. C.)	San Francisco.
G. A. Proctor	San Francisco.
L. B. Redman	Oakland.
F. L. Ringgold	San Francisco.
Frank N. Rogers	Oakland.
J. L. Scotchler	San Francisco.
T. J. Shackelford	San Francisco.
C. M. Sheffield, Ph. B. (U. C.)	San Francisco.
E. Tanszky	San Francisco.
Miss Josie Todman	San Francisco.
Harry I. Thornton	San Francisco.
C. D. Vincent	San Francisco.
W. S. Wagner	Oakland.
W. T. Wallace, Jr.	San Francisco.
J. Walter Ward, Jr.	San Francisco.
H. D. Whittle, A. M. (St. I.)	San Francisco.
P. A. Wyer	San Francisco.
Wm. D. Wood	San Francisco.
C. A. Zwisler	Placerville.
Total	68

## GENERAL STATEMENTS.

During the present College year (1880-81) there will be three lectures daily. Professor Pomeroy will have charge of the Senior and Middle Classes, and Professor Evans of the Junior Class. The classes meet as follows: Senior Class at 4 P. M., Middle Class at 12:30 P. M., Junior Class at 8 A. M.

### DEBATING SOCIETY.

The Society was organized September first, eighteen hundred and seventy-eight. The name denotes its object, but frequently legal questions are discussed and all the advantages of a Moot Court are thus obtained. The affairs of the Society are managed entirely by the members. Students of the Law School are alone eligible to active membership. Meetings are held Thursday evenings at Pioneer Hall, and are open to the public.

### ADMISSION OF STUDENTS, ETC.

1. Students will be admitted to either class and fully matriculated only upon furnishing a satisfactory certificate of their good moral character, and paying to the Registrar the sum of ten dollars as a matriculation fee. Applicants for admission to the First or Junior Class must also satisfy the authorities of the institution that they possess sufficient knowledge and culture to enable them to profit by the course of study. Students applying for admission to the Middle or Senior Class must also pass a satisfactory examination in the studies of the preceding year or years, as the case may be.

2. Gentlemen who do not reside in San Francisco, or its immediate vicinity, and who are desirous of availing themselves of the course of study as *non-resident* students, may at any time file their application to be admitted, upon furnishing a certificate of good moral character, and paying the fee of ten dollars. They will then be entitled to attend as many of the lectures, exercises, and examinations as they may desire, but they will not be considered as fully matriculated students of the Middle year until they shall have satisfactorily passed the examinations preliminary to entering upon the proposed advanced class, and are enrolled as actual members of such class in regular attendance.

3. No student shall be entitled to graduate and to receive the diploma from the University unless he shall have been an actual member of the Senior Class, in regular attendance upon its exercises.

### CLASSES AND THE ACADEMIC YEAR.

1. The entire course of instruction extends through three academic years, and the school is separated into three classes corresponding to these three years, known respectively as the Junior, Middle, and Senior. The course of instruction in each class occupies one academic year.

2. The academic year is the same as that of the University of California, with the usual holiday recess.

## EXAMINATIONS, PROMOTIONS, AND GRADUATION.

1. There will be a regular examination at the close of the Junior and of the Middle year, preliminary to promotion into the next higher class. There will also be a regular examination upon all the studies of the course at the close of the Senior year, preliminary to graduation. These examinations will be either wholly in writing, or partly in writing and partly oral, at the discretion of the Professor of Municipal Law. There will also be intermediate examinations of each class at such times and in such manner as the Professor of Municipal Law shall direct.

2. Members of each of the two lower classes, upon satisfactorily passing the regular examinations at the close of their respective years mentioned above, will be promoted into and become members of the next higher class. Upon being thus promoted into and becoming a member of each higher class, every student will be required to pay to the Registrar the fee of ten dollars, for the purpose of defraying incidental class expenses.

## ATTENDANCE, CONDUCT, ETC.

The proficiency and attainments of each student, and his right to promotion and to graduation, are tested by his examinations, taken in connection with the personal knowledge of his character and the knowledge obtained by the Faculty from the intercourse of the class-room.

It is expected that matriculated students will regularly attend the stated exercises of school.

During their presence in the class-room, and in their intercourse with the Faculty and other officers of the institution, the students are expected and required to adopt and conform to the conduct, principles, and manners of gentlemen.

The authorities will exercise the right of removing any student guilty of any immoral conduct rendering him unfit for the society of gentlemen.

## COURSE OF STUDY—JUNIOR YEAR.

In the First or Junior year, the class will go over the fundamental or general principles and doctrines which constitute the framework of our jurisprudence in all of its most important departments of primary or substantive rights and duties—embracing the law as to persons and personal rights; the law as to personal property; an outline of the law as to contracts, and the law as to real property, with the exception of trusts, powers, and remainders.

The instruction during the year will be given by means of particular text-books, definite portions being assigned for preliminary examination by the class, with an oral exercise, discussion, or lecture upon such lessons, conducted by the Professor in charge. Reference will constantly be made to the statutory legislation of California and of other States, so far as may be found necessary, and also to leading judicial decisions involving the subject under consideration.

In addition to the special text-books used, the class will be recommended to read, in connection with each topic or head of the law under examination, other works in which the subject is more fully treated. It is not expected that each student will read all of these treatises thus indicated for collateral study, or even the whole of any treatise. A list is given from which the members of the class may select, according to their opportunities and the time at their disposal.

## REQUIRED COURSE WITH THE TEXT-BOOKS.

1. *The Law as to Persons*, including the personal rights of life, limb, liberty, and reputation; citizens, voters, and aliens; the domestic relations, marriage, divorce, husband and wife, parent and child, infants, guardian and ward, master and servant, etc. Kent's Commentaries, Lectures 24 to 32 inclusive.

2. *The Law as to Personal Property*, its nature, kind, mode of acquisition, and transfer. Kent's Commentaries, Lectures 34 to 38 inclusive.

3. *Outline of the Law as to Contracts*, including the general doctrines which apply to all contracts. Metcalf on Contracts, and Parsons on Contracts, Vol. 1, Book 1, chapters 1 and 2; Book 2, chapters 1 and 2; Vol. 2, Part 2, chapters 1, 2, 3, 4, 6, 8, and 9.

4. *The Law as to Real Property*, including all its branches, except uses and trusts, powers, and future contingent estates. Blackstone's Commentaries, Book 2, chapters 1 to 20 inclusive; Washburne on Real Property, Vol. 1, chapters 5 to 13 inclusive; Vol. II, chapters 14, 15, and 16; Book 2, chapter 1; Vol. III, Book 3, chapters 1 to 4 inclusive.

## OPTIONAL COURSE OF COLLATERAL READING.

*History and Development of the Law and its Sources*.—Pomeroy's Introduction to Municipal Law.

*Personal Rights* of life, body, limb, liberty, and reputation, and the torts or wrongs by which they may be violated. See the titles, "Assault and Battery," "False Imprisonment," "Malicious or Wrongful Arrest," "Malicious Prosecution," "Slander," "Libel," and the like, in Bigelow on Torts; Addison on Torts, chapters 12 to 17; Hilliard on Torts, chapters 5 to 16; Waterman on Trespass, Book 2, chapters 1 and 2; Bigelow's Leading Cases on Torts, titles: "Assault and Battery," "False Imprisonment," "Malicious Prosecution," "Deceit."

*Slander and Libel*.—See Townshend on Slander and Libel; Starkie on ditto; Smith's Leading Cases, titles: "Libel," "Slander," "Damages;" American Leading Cases, same titles; Bigelow's Leading Cases on Torts, same titles.

*Marriage and Divorce*.—See Bishop on Marriage and Divorce; Schouler's Domestic Relations.

*Husband and Wife, Parent and Child, Infants, etc.*—See Schouler's Domestic Relations; Reeves' Domestic Relations; Bingham on Infancy; Parsons on Contracts, Vol. 1, chapter 17, on infants; Bishop on Married Women's Property; Smith's Leading Cases; case of *Manby v. Scott*, on Husband's Liability for Wife's Contracts; American Leading Cases, title: "Infancy."

*Personal Property*.—See Williams on Personal Property; Belknap on Probate.

*Contracts*.—See Langdell's Select Cases on Contracts, and portions of Smith, Chitty, Story, or Addison, on Contracts.

*Real Property*.—See Smith's Leading Cases; case of *Elwes vs. Mawes* on Fixtures; Williams on Real Property; Kent's Commentaries, Lectures on Real Property; Washburne on Easements, and Jones on Mortgages.

## MIDDLE YEAR.

In the Second or Middle year the class is no longer confined to particular text-books, nor definite lessons. In commencing each impor-

tant subject (*e. g.* Corporations, or Agency, etc.) the class will be furnished with a printed syllabus of the lectures to be given on that topic. This syllabus states in outline the matters to be discussed in each lecture, and the various text-books and treatises, with a reference to the chapters or sections, where the questions are treated. It also gives the "leading cases," English and American, and also cites the subsequent most important decisions in which the principles have been explained, extended, limited, or applied. The class is expected to study by the direction of this syllabus, to read some one or more of the text-books referred to, and especially to study the judicial decisions which are cited. The class will thus be prepared for the oral examination and discussion by the Professor in charge, which are based upon the outline contained in the syllabus. As each syllabus will mention all the standard writers who may be profitably consulted by the class, in connection with each topic, no list of works for collateral reading is here given. The Statutes of the State are constantly referred to and studied.

The course of study embraces a full treatment of mercantile and commercial law, corporations, agency, partnership, sale, bailments, bills and notes, insurance, shipping contracts, suretyship, etc., certain heads of real property law, viz.: Remainders, executory devises, trusts and powers; last wills and testaments, and the administration of the estates of deceased persons; equity jurisprudence, and torts.

#### SENIOR YEAR.

In the third or senior year the course of study contemplates two distinct objects: first, the practical application of the substantive doctrines of the law, which have been studied during the former two years; and second, the giving to the class a more complete and perfect acquaintance with all the departments of jurisprudence than it is possible to do within a period limited to two academic years.

In accomplishing the first of these objects, those branches will be pursued which constitute the remedial portion of the law.

It includes pleading and practice, according to the reformed system of procedure, together with the general theory of common law forms of action, and of common law and equity pleading, and the law of evidence.

The text-books, to which attention will be particularly directed, are Pomeroy's Remedies and Remedial Rights; Pleading and Practice under the California Code of Procedure; Stephens on Pleading; Gould on Pleading; Lubé Equity Pleading; Greenleaf on Evidence; Wharton on Evidence.

The second general object will be accomplished by instruction in the following subjects: Constitutional Law of the United States and the State; International Law, public and private; Medical Jurisprudence; Roman Law and General Jurisprudence; the Principals of Morality in their application to the Law and to its practice; Criminal Law; and, it is hoped, Admiralty Law, and Patent Law.

#### MOOT COURT.

A Moot Court will be established, as a regular mode of instruction, for the argument of causes and the discussion of legal questions by members of all the classes.

## GENERAL MATTERS.

### MEETINGS OF REGENTS.

The Board has met nineteen times during the year, viz., at four regular, four adjourned, and eleven special meetings, an increase of three meetings over the preceding year; the average attendance has been about ten.

### CHANGES IN THE REGENCY.

January 1st, ex officio Regents, Governor Perkins, Lieutenant Governor Mansfield, Speaker of the Assembly Cowdery, Superintendent of Public Instruction Campbell, as successors of ex officio Regents Irwin, Johnson, Berry, and Carr. Governor Perkins has appointed the following: Hon. A. L. Rhodes, vice Casserly, resigned; Hon. B. B. Redding, vice Pixley, resigned; Professor William Ashburner, vice Bowie, term expired; Hon. John Bidwell, vice Archer, term expired.

### IMPROVEMENT OF THE UNIVERSITY GROUNDS.

After appealing in vain to several Legislatures for State aid for the grading and other improvements to the grounds immediately around the main buildings, and there being no reason to hope for better success in that quarter, in the face of the many pressing wants for which legislative assistance is solicited, the important work of the main or grand terrace was commenced with such means as the Regents could afford to devote to the improvement of the grounds, the greater portion of which has been expended upon this principal object. As the terrace is the key or guide to all future improvements both above and below it, the necessity of pushing it so as to properly connect the other work becomes apparent. In order to carry on the work, however, which is nearly completed, it compelled the partial neglect of the grounds in other directions. It is to be regretted that the edgings and steps are of wood instead of stone, but the expense of the latter made the adoption of the more perishable material a necessity.

The cost of keeping the terrace plats and slopes in grass also required the adoption of a less attractive substitute, and led to the selection, after experiment, of a species of *Mesembryanthemum*, which grows luxuriantly without watering, and makes a compact and close, though rather coarse, mat of dull green.

Under the circumstances incidental to the limited means at command for this work, and that the men, or some of them, are frequently called upon for service in other directions, Mr. John Ellis, the gardener, is entitled to great credit for the manner in which the work has thus far been performed.

A hedge of the Monterey cypress, *Cupressus macrocarpa*, has been planted along the western line of the University grounds, and though the plants were small, they have, with few exceptions, rooted well, and will in a short time make a good showing.

The botanical garden and experimental plats, which occupy most



of the ground west of the northerly branch of the stream, have practically been under the charge of the Professor of Agriculture, and have been carried on by means of the special appropriations made for the Agricultural Department by the Legislature, and a very interesting comparative exhibition of growing cereals, as well as of other forms of economic value to the farmer, and of more general value to the State, has been made.

#### WATER MATTERS.

At the meeting of December 1st, 1879, the Secretary read the report of J. B. Mhoon, Esq., attorney for the Board, in the matter of the condemnation of certain water rights, etc., under the Act of the Legislature, approved April 1, 1876 (Stat. 1875-6, page 16), entitled "An Act to provide a supply of water for the University and for the Asylum for the Deaf, Dumb, and Blind;" also the report of the Commissioners appointed by the District Judge of the Third Judicial District to appraise the value of the springs and lands mentioned in the complaint, etc., and sought to be condemned.

The recapitulation of total awards, as shown in the report, is as follows:

To Miss A. Pfeiffer .....	\$13,595 74
To W. H. Glascock .....	3,507 05
To Theo. LeRoy .....	3,842 21
To W. J. Shaw .....	678 31
To H. P. Berryman .....	62,299 19
Total .....	<u>\$83,922 50</u>

After discussion it was voted to recommend to the Governor the acceptance of the award so far as it relates to the Pfeiffer, Glascock, and LeRoy interests, which aggregate \$20,945.

At the same meeting the Board appointed a special committee, consisting of Regents Winans, Pixley, and Martin, to inquire into the condition of the claim of the University to the Heywood Springs, and the expediency of asserting the same by law.

On the 15th December the Board passed a resolution, requesting the Attorney-General, through Attorney Mhoon, to dismiss the proceedings to condemn certain water rights under the award of the Court, so far as the same relate to Berryman and Shaw.

On the following 14th February a special meeting was held, pursuant to the call of the Governor, who desired to confer with the Board in relation to the condemnatory decree in the matter of water supply for the University, and Deaf, Dumb, and Blind Institution, and the action of the Board therein at the meeting of December 1st.

The Governor stated that some of the parties named in the decree had, through their counsel, been urging him to issue his certificate for the [total] amount of the award; that while the Regents had approved of a portion of the decree, and had recommended him to approve the portion named by them, that the other parties named in the decree contended that it was an entirety, and could not be divided, and that said parties also pleaded that it was a hardship to them, because it prevented their doing with their water rights whatever they might find for their interest to do with said property.

Again, that it had been represented to him that the amount of the award was in excess of the value; and it had been further repre-

sented that the language of the decree was such that only those named in the decree could receive the amount of the award, while it might be that some of the parties so named were not the real owners, but the title might be in the Peralta heirs, etc., or others. Under these circumstances he had called this meeting to enable him to confer with the Regents, and to request their assistance in the premises.

After a prolonged discussion, the following, offered by Regent Swift, was finally adopted:

*Resolved*, That the resolution of this Board, adopted December 1st, 1879, with respect to the condemnation of water sources and property for a water supply for the University, be rescinded and repealed, and that it is the opinion of this Board that the Governor should reject as a whole and refuse to confirm the report of the appraisers and the judgment of the Court thereon condemning such land and property.

On the 18th of May Regent Rhodes submitted, at the request of the Governor, a printed copy of the application for a mandamus by the counsel of Berryman to compel the Governor to sign the certificate of approval of the valuation as herein reported. At a subsequent meeting Attorney Mhoon presented copies of his brief in the case, and at the meeting of June 25th the Committee on Grounds and Buildings reported in relation to various communications touching water matters, and recommended that the latter remain in abeyance to abide the result of the mandamus suit.

#### PERPETUAL ENDOWMENT FUND.

In pursuance of the authority of the Board, and of the course heretofore pursued, the Finance Committee and the Treasurer have purchased from time to time during the year as the Land Fund accumulated, being an investment of the principal of the Land Fund, approved securities of the par value of \$1,000, for \$1,065, as will be seen upon reference to the financial tables in the appendix hereto, which also gives a description of the bonds.

#### STATE GEOLOGICAL SURVEY.

The agency of the sale of the publications of the late survey has been continued as heretofore, with Messrs. Payot, Upham & Co., of San Francisco; and the sales for the year have netted \$90 91, which has been collected and paid into the State Treasury as per receipt on file in the office.

The insurance of the lithographic stones (in the care of Mr. Julius Bien, of New York), upon which are certain drawings of maps, has been continued in the same amount as heretofore, viz.: \$6,000. Of the appropriation made by the Legislature under the special Act of March 27th, 1874, for the preservation of the material of the survey, there remains on the books of the University, \$454 63 to meet future expenditures.

#### LICK OBSERVATORY BEQUEST.

In a communication dated January 28th, Attorney Mhoon informed the Board that the case of John H. Lick, administrator, etc., vs. R. S. Floyd et al., had been settled, judgment entered for defendants and cause dismissed with costs on the 31st of December, 1879; a result "satisfactory to the University."

## REESE LIBRARY FOUNDATION.

On the 2d day of July the amount of the bequest of Michael Reese was paid into the hands of Regent Mills, the Treasurer; the proper account has been opened to the credit of the same in the books of the Secretary's office.

On the 7th of August the Board authorized the Finance Committee to loan the amount of \$50,000, on satisfactory real estate security. The accumulated interest on the 30th of June was \$3,444 44.

## THE TOMPKINS ENDOWMENT

Of the Agassiz Professorship of Oriental Languages and Literature has standing to its credit \$1,216 73, being the total amount received to date for rent of the land given for the above by Mr. Tompkins. Whether said land can be sold for a price sufficient to meet the terms of the gift is exceedingly doubtful at the present time. Projected railroad facilities in this direction from Oakland, if prosecuted to completion, will undoubtedly cause this property to advance materially.

## MUSEUM.

Many valuable acquisitions have been made to the museum during the year, as will be seen by glancing at the lists.

The great want of show cases has been met to an important extent by the appropriation made by the last Legislature for the mineralogical department, as the cases heretofore used for minerals will be relieved from said service and used for the preservation and exhibition of other material, while new and especially adapted cases are provided by said appropriation for the minerals. These latter cases, as well as other much needed furniture, etc., for the instructional side of the mineralogical department have already been ordered by authority of the Board.

(For list of additions and names of givers, see appendix.)

## BACON LIBRARY AND ART BUILDING.

On the 2d of September, plans were solicited by advertisement, and a premium of \$250 was offered for the plan deemed the best by the Board. In response, several plans were received, all of which were rejected. Subsequently the committee employed Mr. J. A. Remer to make a plan embodying the ideas of the committee and his own, and on the 15th of December the committee submitted the completed plans and specifications, which were formally approved by the Board on the 22d of August, it being understood that the same were satisfactory to Mr. Bacon; and further, that the building could be erected within the amount of money at the disposal of the Board for the purpose.

At a special meeting March 26th, the Board authorized the drawing from the State treasury of the amount of the legislative appropriation made by the State to meet the conditions of Mr. Bacon's offer of a similar sum. At the following meeting the Finance Committee reported that the \$25,000 from Mr. Bacon had been received, and the same amount from the State. On the 2d of April, the form of advertisement for furnishing materials and labor was submitted by the committee, and approved by the Board.

On the 18th of May, the committee, through the Chairman, reported that on the 15th of May, the day named in the advertisement, the committee had opened the bids, of which there were fourteen, in the presence of the bidders, and recommended the acceptance of the bid made by Robert Mitchell—\$47,759—it being the lowest, and the bidder having the reputation of being a man of standing and responsibility. Also, the committee recommended the appointment of Robert McKillican as Superintendent of construction.

The report of the committee was accepted and the recommendations adopted.

Work was commenced on the building on commencement day, June 2d.

The payments on account of the above have been as follows :

Advertising for plans.....	\$67 10
Advertising for proposals.....	390 50
Printing specifications.....	18 00
Architect's commission.....	800 00
Total.....	\$1,275 60

#### DEGREES CONFERRED.

On the 4th of November, 1879, upon the recommendation of the Faculty of the Medical College, the degree of Doctor of Medicine was conferred on thirteen graduates in said department; and subsequently, upon the proper recommendation of the Faculty of the College of Pharmacy, the degree of Graduate in Pharmacy was conferred on seven graduates in said College.

Upon the recommendation of the Faculty, the Board conferred the degree of Bachelor of Philosophy on fourteen graduates in the scientific Colleges, and twenty in the College of Letters (literary course); and Bachelor of Arts on ten graduates in the College of Letters (classical course); the University medal was awarded to Miss Mary Alice Hawley; and a certificate of proficiency in certain studies was granted to Joseph Mailliard.

#### MEDICAL DEPARTMENT.

During the year certain changes in the Chairs of said department have been made, as follows:

H. Ferrer, M. D., as Professor of Pathology and Microscopy, vice Dr. Bentley.

Robert A. McLean, Professor of the Principles and Practice of Surgery.

#### COGSWELL DENTAL COLLEGE.

On the 10th of February, the following appointments were made in the Cogswell College of Dentistry:

Samuel W. Dennis, to the Chair of Operative Dentistry, and A. F. McLain to the Chair of Regional Anatomy and Surgery.

#### HASTINGS COLLEGE OF THE LAW.

At a meeting of the Board of Regents, held August 7th, 1879, the following was adopted :

*Resolved*, That the institution known as the Hastings College of Law shall be affiliated with the University of California, and made an integral part of the same, and incorporated therewith, upon the following terms and conditions, which are hereby made a part of such affiliation and incorporation:

*First*—The Directors of said College, named in the Act of Legislature which organized it, approved March 26th, 1878, shall have authority to fill vacancies in their Board when the same occur, as prescribed in the said Act, subject to the approval of the Board of Regents of said University, except in so far as qualified by the next section.

*Second*—Honorable S. Clinton Hastings, as founder of said College, and his legal representatives, shall always be entitled to have the appointment from his heirs or representatives of one of said Directors, without such appointment being subject to the approval of the said Board of Regents.

*Third*—The Faculty of said College shall have the authority to present to the said Board of Regents the names of such students of said College as they recommend for diplomas; and the said Board of Regents shall issue diplomas to said students, subject to the right of said Regents to refuse the same for cause.

*Fourth*—As soon as practicable, there shall be set apart for the use of the students of said College, some room or suitable hall at the University.

*Fifth*—The present Dean of said College, the Honorable S. Clinton Hastings, shall during his lifetime have a seat in the Academic Senate of said University, be a member thereof, and have a vote therein.

*Sixth*—The said College shall be subject to the dominion of the said Board of Regents in all matters pertaining to its management and welfare.

*Seventh*—The number and duties of the Professors of said College shall be prescribed, and the business of said College managed, by said Board of Directors, subject to the approval of said Board of Regents.

The committee on the affiliation of the Hastings Law College with the University respectfully report that the plan and method of such affiliation, which seems to them suitable and proper, and which is acceptable to Honorable S. C. Hastings (having been fully approved by him), are embodied in the foregoing resolutions, which your committee have prepared, and of which they recommend the adoption.

#### AGRICULTURAL DEPARTMENT.

The botanical garden and experimental plats, which occupy most of the ground west of the northerly branch of the stream on the University grounds, have practically been under the charge of the Professor of Agriculture, and have been carried on by means of the special appropriations made for the Agricultural Department by the Legislature, and a very interesting comparative exhibition of growing cereals, as well as of other forms of economic value to the farmer, and of more general value to the State, has been made.

During the year Mr. C. H. Dwinelle has continued to lecture on Practical Agriculture; and Mr. E. J. Wickson has also delivered a course of lectures on Dairy Farming and matters related thereto.

As a report from this department, supplementary to this, will be submitted later in the year, it is not necessary to enlarge here upon the operations of said department.

Of the appropriation made for the special use of this department by the Legislature (twenty-second session), only \$627 44 remained unexpended on the 1st of July. (For the disbursements in this connection, see financial statements.) The appropriation of \$5,000, made by the last session, will all be expended during the current fiscal year, and provision should be made for the continuation of the work by a similar appropriation at the twenty-fourth session.

#### VITICULTURAL COMMISSION.

The Act of the last Legislature establishing a Commission as above includes an appropriation of \$3,000, to be expended under the direction of the Professor of Agriculture for viticultural investigations, etc.; and the Board, on the 18th of May, appointed a special committee to coöperate with the Commissioners under said Act, and facili-

tate the accomplishment of the purposes sought thereby. The committee consists of Regents Bidwell, Beard, Larue, and Redding.

As the funds as above appropriated were not available during the period covered by this report, being applicable only to the fiscal year ending June 30th, 1881, no further information can be furnished at this time.

#### INSURANCE ON BUILDINGS.

Insurance of the University buildings against fire has been continued in the following amounts:

North Hall, or College of Letters .....	\$75,000
South Hall, or College of Agriculture .....	50,000
Mechanical Arts College building .....	30,000
Students' cottages .....	12,000
Barn and contents .....	2,750

There are policies on the Harmon Gymnasium for the sum of \$10,000, the premium being the gift also of Mr. Harmon, running \$7,500, three years, expiring November 17th, 1881; \$2,500, three years, expiring January 13th, 1882. Insurance of the books, pictures, and statuary, given to the University by H. D. Bacon, Esq., was paid by the giver.

#### CONSOLIDATED PERPETUAL ENDOWMENT FUND OF THE UNIVERSITY OF CALIFORNIA

Is the legal title under the Act approved March 19th, 1878, of the permanent fund of the institution, which also makes the Treasurer of the State the authorized and responsible custodian thereof.

The policy of the Board is to augment the above fund as far as it is possible, and within their ability; consequently the Finance Committee were instructed to set aside for investment, for the benefit of the Perpetual Endowment Fund of the University, all interest money accruing from deposits in savings banks from excess payments, certificates of deposit, or from other sources.

During the year the committee reported "considerable difficulty in investing the funds in good safe bonds at anywhere near the rate of interest paid by bonds now held, and which are rapidly maturing."

"The Congressional Act making the grant of 150,000 acres to the University requires that the proceeds shall be invested in good safe bonds yielding not less than five per cent. per annum. This is very difficult to do at this time, and will be impossible in a very brief time. They therefore thought that Congress should be petitioned to modify the Act so as to enable the Regents to invest in four per-cents, and to pass a further Act granting to the Regents a further endowment of land sufficient to bring the income back to its present amount—the difference being as between four per cent. and six per cent., and as between 150,000 acres and 225,000 acres=75,000 acres."

#### DECREASE OF INCOME.

"When all the bonds now held by the Regents for the maintenance of the University mature, which will be in ten years, the annual income \* \* \* \* will be reduced from \$101,772 to \$65,780 64, and the decrease of income will commence as our bonds mature, \$20,000 having been called in during the year."

To provide as far as possible against such impairment of income, it was deemed best to seek relief by national legislation.

In connection with the investment of moneys accruing from sales of land received under the Congressional grant of 1862, the Act requires that the moneys so received "*shall be invested in stock of the United States, or of the States, or some other safe stocks, yielding not less than five per centum upon the par value of said stocks.*" On the first of December, the attention of the Board was called to the difficulty which the Finance Committee "encountered in finding stocks that, while secure, would yield the income required by the Act," and said committee submitted the following:

*Resolved*, That the Board of Regents petition Congress to empower them to invest funds arising from the sale of lands from the Congressional grant, in United States four per cent. bonds, if no more profitable bonds, equally as secure, offer.

The resolution was amended so as to include the power to invest in "satisfactory real estate mortgages," and was then adopted and Congress was memorialized accordingly, through the California delegation in the national legislature. Subsequently a letter was received from Senator Booth, informing the Board that the bill prepared and introduced by him, in furtherance of the object sought by the Regents in their memorial, had passed the Senate and awaited favorable action in the House.

#### STATE LEGISLATION.

At the request of the Board, and with the consent of the State officers named in the Act, the Legislature of 1877-8 passed the following law:

SECTION 1. The Controller of State, the Surveyor-General, the Attorney-General, and State Treasurer are hereby appointed a Commission for the purpose of examining and reporting to the next Legislature the condition and disposition of the Congressional Seminary Land Grant of seventy-two sections and interest arising therefrom; the Congressional Public Building Land Grant of ten sections and interest arising therefrom; the transfer of certain bonds in accordance with an Act entitled "An Act requiring the Controller of State to transfer certain funds," as provided for in section one of said Act, approved March 26th, 1868; the condition and amounts of money received from the sale of tide lands and invested under an Act entitled "An Act for the endowment of the University of California," approved April 2d, 1870; the amount of money paid to the Regents of the University of California in conformity with an Act entitled "An Act to provide for the support of the University of California," and the several dates of payment thereof, approved April 1st, 1872.

SEC. 2. As soon as practicable after the passage of this Act the persons named in section one of this Act shall proceed to examine the books of the State Controller, the Surveyor-General, the State Treasurer, and the various Acts concerning the State University, for the purpose of determining the condition and disposition of the various funds mentioned in section one of this Act.

SEC. 3. It shall be the duty of the said Commission to report the results of their examinations, as provided in sections one and two of this Act, to the next Legislature of this State.

The commission reported to the Legislature, and a bill was introduced, at the request of the Board of Regents, by Senator Davis, Chairman of the Senate Committee on Education, and referred to the Judiciary Committee of the Senate, before whom, in behalf of the University, in pursuance of the instruction of the Finance Committee, Mr. J. B. Mhoon, attorney, and Mr. J. Ham. Harris, Land Agent and Assistant Secretary, appeared upon two or more occasions. As no definite result was reached in the Judiciary Committee at the last session, the matter, it is to be hoped, will receive the earnest attention of the next Legislature, and this just demand of the University be favorably considered.

## ABANDONMENT OF CERTAIN LANDS.

In pursuance of the efforts heretofore made to procure the cancellation of certain applications for lands, which it is for the interest of the University to abandon (amounting to 19,212.63 acres, see last Annual Report, page three), the arrangement with Mr. Shanklin having terminated by limitation on the 20th of June, 1879, a new bill was prepared to be presented to Congress, of which the annexed is a copy, and the California delegation in Congress were urged to press its passage. The bill was introduced by the Hon. J. T. Farley, but no definite action has been reached, for the reason, as understood, that the Commissioner of the General Land Office regards the deed of conveyance from the State authorities to the United States as insufficient:

## A BILL FOR THE RELIEF OF THE STATE UNIVERSITY OF CALIFORNIA.

Be it enacted, by the Senate and House of Representatives of the United States of America in Congress assembled: That the Commissioner of the General Land Office shall accept the deed now on file in the General Land Office, dated the 4th day of September, 1878, from the State of California to the United States, relinquishing all claim to the lands therein described which were applied for under the Act of Congress, approved July 2d, 1862, entitled "An Act donating public lands to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts," and the other Acts of Congress relating to the grant of land made by said Act.

And the Commissioner of the General Land Office shall cause to be canceled on the records and files of the general and local land offices any or all selections described in said deed, upon receipt of satisfactory evidence from the State of California that the title to the lands so relinquished is not incumbered.

On the 2d of March a proposition was submitted (dated February 28th) from Mr. E. O. F. Hastings, offering to take charge of such matters at Washington as the Regents might intrust to him, and a contract was accordingly made with Mr. Hastings, submitted by the committee, and formally approved by the Board on the 2d of April. As evidence of authority to act, a formal letter of appointment, signed by the Governor and Land Agent of the University, was given to the said attorney.

## EXCESS PAYMENTS.

The amount due the National Government on account of the above, being the aggregate of receipts of \$1 25 per acre on double minimum lands sold by the University under the Congressional Grant of 1862, was, on the 30th of June last, \$40,716 07. The amount paid the Government on these lands during the year is \$5,324 65.

## INCOME AND EXPENDITURES.

The estimated income for the year ending June 30th, 1881, is \$98,972, and the estimated expenses are \$102,269 92, indicating a deficiency of \$3,297 92, the income as above being from ordinary and permanent sources, and the expenditures being the ordinary or usual expenses. Other and special income available only for particular purposes outside of the General Fund, are the special appropriations of the last (twenty-third) session of the Legislature, and the remainder of previous appropriations (of the twenty-second session), making altogether from these latter sources \$25,416 27 for certain purposes in the Agricultural, Mining, Mechanical, and Mineralogical Departments.



## THE LIBRARY.

During 1879-80 few accessions have been made to the library other than by gift.

Besides more than 500 pamphlets, 141 volumes have been received by gift from the following:

Name.	Vols.	Name.	Vols.
Anonymous-----	1	Perkins, Governor George C.-----	1
Arkansas Industrial University-----	1	Philadelphia Franklin Fire Insurance Co.-----	1
Armstrong, Hon. J. M.-----	1	Pickering, Mrs. Sarah S., Boston.-----	1
"Berkeleyan" editors-----	1	Randol, J. B., New Almaden (besides pamphlets)-----	1
Boss, Professor Lewis-----	1	Sanborn, F. B., Hartford-----	1
Burke, William C., class of 1879, University of California-----	2	San Francisco Board of Supervisors-----	1
Burns, Hon. D. M.-----	6	San Francisco Chamber of Commerce-----	1
Circulating library-----	1	Selwyn, Alfred R. C., Montreal-----	2
Copenhagen, University of-----	4	Smithsonian Institution-----	8
Crunden, F. M., St. Louis-----	1	Spain, Ministeria de Fomento (through Hon. Camilo Martin)-----	2
Davis, Hon. Horace-----	14	United States Bureau of Education-----	1
Dwinelle, Charles H.-----	1	United States Bureau of Steam Engineering-----	3
Dwinelle, Hon. John W.-----	1	United States Coast Survey-----	2
Doyle, Patrick-----	1	United States Department of Agriculture-----	2
Edinburgh Royal Astronomical Society-----	1	United States Department of the Interior-----	8
Farley, Hon. James T.-----	7	United States Department of State-----	3
Field, Hon. Stephen J.-----	1	United States Department of the Treasury-----	2
Folsom, Charles F.-----	5	United States Department of War-----	1
Hall, Charles E., San Francisco-----	1	United States Naval Observatory-----	3
Hallidie, A. S.-----	1	United States Ordnance Bureau-----	1
Hawkins, L. L.-----	1	United States Signal Service Bureau-----	2
Hittell, John S.-----	4	United States Surgeon General's Office-----	1
Illinois Industrial University-----	1	Vickers, Rev. Thomas, Cincinnati-----	4
Kellogg, Prof. Martin-----	3	Walker, Col. J. T., India-----	4
Le Conte, President John-----	1	Wheeler, Lieutenant George M.-----	1
Leeds, Prof. Albert R. (besides pamphlets)-----	1	Williamson, Hon. J. B.-----	7
Mann, Azro L.-----	5	Williamson, Col. R. S.-----	1
Missouri State University-----	2		
Newcomb, Prof. Simon-----	1		
Nicholson, J. Holme, Manchester-----	1		
Page, Hon. H. F.-----	3	Total volumes-----	141
Paine, Martyn, M. D.-----	1		

## THE UNIVERSITY MUSEUM.

## MEMORANDA OF ADDITIONS TO THE MUSEUM—1879-80.

## TO THE MUSEUM OF ETHNOLOGY.

- CLARKE, W. RUSSELL, Class '81.—A small obsidian arrowhead, from the field south of the Campus, Berkeley.
- CRAWFORD, A. W., Oakland.—An Indian skull, from Mound at Santa Cruz.
- CUNNINGHAM, J. F., Felton, California.—A freshly exhumed Indian skull.
- EARL, GUY C., Class '83.—A hunting bow, quiver, and arrow of a Piute Indian.
- HARMON, E. N., Class '83.—Two canoe paddles, a compound carving, in wood, of figures of animals, made by the Northern Coast Indians; and a wood carving, in form of a bowl, having at one end a representation of a dog's head, from Alaska.
- HAWKINS, L. L.—Basket made by Washoe Indians; buckskin glove made by Nez Perces Indians; and a lance or spearhead in obsidian, found on University grounds, Berkeley.
- HOOG, WM. W., Oakland.—Fish-hook, made from the shell of the pearl oyster by the Indians of the North Pacific.
- KUNZIE, MRS. J. H., Umatilla, Oregon.—Arrowheads and necklet pendant of Indians of Oregon.
- MARSHALL, Chief Engineer steamship Zealandia.—Australian boomerang.
- MERRILL, CLARENCE S., Berkeley.—Spearhead in obsidian, from Antioch, California.
- OLMSTEAD, MRS. E. W., Gualala, Mendocino County, California.—Spearhead in obsidian.
- PARTSCH, HERMAN.—Large Indian mortar, from near Soledad, California.
- PAYNE, DR. FRANK HOWARD, Berkeley.—An Indian skull, having a tooth abnormally situated in the middle of the palatal bone; found in the mound at the powder works at West Berkeley.
- STEARNS, R. E. C.—A heavy Indian mortar formed in a lump of basalt; a mortar made in a portion of a basaltic column, and portions of two other mortars of lighter colored lava: from Kellogg, Knight's Valley, California.
- TENNY, REV. W. A., Temescal, California.—A well wrought circular stone disc, supposed to be used as a crusher, from its having excavations that fit thumb and finger, and from its bruised face; from near Indian Encampment, Westport, Oregon.

## TO THE MUSEUM OF ZOOLOGY.

- CARPENTER, E. T., Berkeley.—*Falco sparverius*.
- CARROLL, H. W.—Living example of *Mygale Hentzii*.
- CHENEY, L. W.—Tubularia from Monterey, California.
- CLARK, J. H., Castro, Mendocino County, California.—Two specimens of the American Civet, *Bassaris astuta*, and two examples of the meadow mouse, *Arvicola edax*.
- CONYERS, DR. BENJAMIN, Phoenix, Arizona.—A fine living example of the "Gila monster," *Heterodermia suspectum*.
- ELLIS, JOHN, JR., Berkeley.—Several nests and eggs of native birds.
- FINNIE, W. F., Grass Valley.—The rare snake, *Ophiobolus pyromelas*; yellow billed magpie, *Pica Nuttallii*; the hawk, *Accipiter fuscus*; evening grosbeak, *H. Vespertina*.
- GALLY, MISS MATTY, Watsonville.—A fully grown specimen of *Eutamias dorsalis*, and an example of *Gerrhonotus multicarinatus*.
- HARMON, E. N., Class '83.—Canine tooth of *Ursus cinnamomea*, from Gualala, Mendocino County.
- HARRIER, LEWIS G., Class '80.—Six specimens of American Bombycidae.
- HARRIS, WM., Berkeley Gymnasium.—*Gerrhonotus multicarinatus*.
- HART, JOHN, Berkeley.—Fine specimen of *Lynx rufus*, and two of *Memphitis memphitica*.
- HAYES, JAMES, Class '83.—Fossil *Ostrea* from Pacheco Point.
- HEWITT, FRED.—Examples of perfect insect and pupa cases of the "17-year locust," *cicada septendecim*.
- HEYWOOD, R., Gualala.—The rare *Rosalia funebris*.
- HILGARD, EUGENE.—*Falco sparverius*.
- HYDE, ALTON.—The hawk, *Circus Hudsonius*, from Berkeley.
- JASPER, W. G.—*Strix pratensis*, and *corvus caurinus*.
- JONES, DR. WILSON, Phoenix, Arizona.—An example of the rare *Contia isozona*.
- MOREY, —, Phoenix Arizona.—Some insects *chrysomelidae*.
- KLEE, WALDEMAR G.—*Bassanion vetusta*.
- MCGILLIVRAY, W.—Horned lizard from Forest Hill, showing variation from common form.
- MAYHEW, LEWIS.—Gualala, Mendocino County, River trout and River bullhead.
- MEDBEY, MISS M., Class '83.—Five nests of *Mygale Hentzii* from Nassau Valley, Calaveras County.
- MEER, MRS. WILLIAM, San Lorenzo, California.—Eggs of *Pavo cristatus*.
- MEYER, REV. WM., Phoenix, Arizona.—A specimen of *Smerinthus sp.*
- MURRAY, JOHN JR., Berkeley Gymnasium.—*Sceloporus occidentalis*.
- OLMSTEAD, MRS. E. W., Gualala.—The shell and mouth pieces of *Strongylocentrus Franciscanus*, and a series of *Hadrotis splendens*.

- PALMER, THEODORE, Berkeley.—*Wenon plumbea*, from Strawberry Cañon, Berkeley.
- PRICE, PROF. A. F., San Francisco.—The "Gila monster," *Heloderma suspectum*, the fine lizard *Phryne obesa*, and a six-spined horned lizard, *Phrynosoma* sp. All from Arizona.
- ROWELL, ED. T., Swansea, California.—A living specimen of a *Vesperillio*, new to the collection.
- SEARS, J. R.—Three examples of *Apus acqualis*, from near Las Vegas Ranch, Arizona.
- SHEPARD, MISS MAY L., Berkeley.—Several species of starfishes from Monterey.
- STEVENS, W., Berkeley, Class '83.—The hawk, *Circus hudsonius*; and the owl, *Strix pratincola*.
- UTTON, FRANK S., Fanning Island, Pacific.—Some examples of Fanning Island fauna, among which are *Hemiramphus*, some *Arachnida* and some examples of insects.
- TREADWELL, G. A., Phoenix, Arizona.—Various examples of organic Natural History, among which are, *Bascanion laterale*, two specimens, several *Eutania*, *Diadophis*, *Crotalus scutellata*, and several examples from the orders *Coleoptera*, *Hemiptera*, and *Arachnida*.
- THIBODO, DR. O. G., Phoenix, Arizona.—Specimens of tarantula and rare snake from Arizona.
- TOWNSEND, W. R., 306 Montgomery street, San Francisco.—Curious spider.
- TOOHY, JAS. L., Tulare County, California.—Specimen of California badger, and skull of wild cat.
- TOOHY, W. J., Visalia, California.—Skull of *Felis concolor*.
- VOY, C. D., Oakland, contributed the following: *Liparus pulchellus*, *Zaniopsis latipennis*, *Chitonotus megacephalus*, *Brachiopsis verrucosus*, *Arctedius quadseriatus*, *Lepidogobius gracilis*, all from California. From Tahiti, a centipede and a scorpion; and eight feathers from the tails of the "Tropic Bird."
- WALDEN, GEORGE R., Napa County.—Specimens of *Eumeces quadrilineatus*, *Gerrhonotus multicarinatus*, *Sceloporus occidentalis*, and *Brachioceps attenuatus*.
- WALKER, MRS. W. W., San Francisco.—Insects of several orders collected in the neighborhood of Santa Cruz.
- WOOD, J. W., Oakland.—Specimen of Octopod, from the Bay of San Francisco.
- WOODMAN, F. N., Class '82.—Specimen of Nuttall's whippoorwill, from Berkeley; and an example of the golden plover, *Chazadrius fulvus*, from marshes near San Francisco.

## TO THE MUSEUM OF BOTANY.

- CARNALL, NATHAN C., Berkeley.—Section of an oak tree of peculiar growth.
- GALVIN, M. J. C., Gualala Mills.—Three selected slabs of redwood, *sequoia sempervirens*.
- HARMON, CHAS. A., San Francisco.—A piece of the trunk of the California yew tree, and a section of white fir from Gualala Mills, Mendocino County.
- HARMON, E. N., Class '83.—Section of *Sequoia sempervirens*, 32x12; section of hemlock spruce, *Abies mertensiana*; and section of red spruce, *Abies douglasii*.
- HEYWOOD, W. B., Gualala Mills.—Large piece of bark of the redwood, *Sequoia sempervirens*.
- LEMMON, J. G., Professor of Botany, Sierra Valley, California.—Specimens *Spraguea umbellata*, *Linnea borealis*, *Astragalus Austinae*, and *Godetia viminea*.
- SCHRAM, JACOB, Napa County.—Portion of a large section of a Madrona tree.
- VOY, C. D., Oakland.—Some turf of *Sphagnum* from modern morass, from Oregon; also the apex of a frond of lancewood.

## TO THE MUSEUM OF GEOLOGY.

- BOYD, JOHN, Cold Springs, Cariboo, B. C.—Fossil humerus, and part of pelvis of *Bos* sp.—(?)
- KINNEY, DR. AUG. C., Oregon.—Polished lignite, from Oregon.
- LINCOLN, E. M., Calistoga, Napa County, California.—A single joint of the caudal vertebrae, found with other fossil bones of the larger fossil mammals in Bird Valley, Yolo County, California.
- PARTSCH, H., Berkeley.—Large number of fragments of fossil bones (supposed whale) from the sandstone of Monterey.
- RICHARDS, F., Oakland.—Some fossil plants from Monte Diablo.
- WALKER, F. H., Rocklin.—Fine piece of opalized wood.
- WALKER, W. W.—A box containing numerous objects of Natural History, from Santa Cruz.

## TO THE MUSEUM OF ECONOMIC GEOLOGY.

- DARLING, T. D.—Bavarian Mine, Los Angeles County, California.
- EDWARDS, G. C., Berkeley.—San Francisco Copper Mine, Nevada County; Rising Sun Copper Mine, Colfax, Nevada County.
- FARISH, J. B., Silver Cliff, Colorado.—Silver Cliff Mine, Custer County, Colorado; Bassick Mine, Custer County, Colorado.
- HUNTLEY, D. B., Oakland.—Peck Mine, Black Warrior Mine, Silver Prince Mine, and Tus-cumbia Mine, Yavapai County, Arizona.
- LEWIS, L. J.—Garibaldi Gold Mine, Calaveras County, California.
- LONG, L. H., San Francisco.—Wilson Quicksilver Mine, near Vallejo, Solano County, California.
- MCGILLIVRAY, J., Placer County.—Pardanelle and Oro Placer Mine, in Placer County, California.
- SHOCKLEY, W. H., Jones Hill, El Dorado County, California.—Placer mine at Jones Hill.
- SUPERINTENDENT OF SAN FRANCISCO COPPER MINE, Nevada County, California.—San Francisco Copper Mine, Nevada County, California.

## TO THE MUSEUM OF MINERALOGY.

- BARTLETT, A. L.—Garnet from Fresno County, California.
- BICE, J. W., Berkeley.—Actinolite from vicinity of Healdsburg, Sonoma County, California.

- BRADLEY, C. B., Oakland.—Aragonite from Mount Shasta, California.
- CARROLL, H. W.—Chalcopyrite, Copper Hill, Amador County; auriferous pyrite, Placerville.
- CHRISTY, S. B., Berkeley.—Roscoelite, Granite Creek, El Dorado County, California.
- FIEDLER, F., Superintendent Sulphur Bank Mine, Lake County, California.—Antimonite from the mine.
- FINNEY, W. F., Colfax, Placer County.—Asbestos from Colfax.
- FRICK, E., Class '83.—Six specimens of gold ore from Black Bear Mine, Lewiston, Trinity County, California.
- GHISELIN, DR. G. F.—Arsenopyrite from the Florence Mine, near Placerville, El Dorado County, California.
- GOODYEAR, W. A., San Salvador.—Twenty-five specimens of coal from Washington Territory; twenty specimens of auriferous minerals from Quail Hill, Calaveras County; four specimens of wulfenite from Utah; forty specimens of miscellaneous minerals.
- GREEN, E., San Francisco.—One large specimen containing ruby silver, fahlerz, sphalerite, chalcopyrite, and quartz from the Sheba Mine, Nevada, and a very large specimen of ore from the Great Western Quicksilver Mine, in Lake County, California.
- HARDING, ARG., Berkeley.—Fahlerz from the Silver King Mine, Arizona.
- HATCH, A. T., Cordelia, Solano County.—Nine crystals of orthoclase from Nevada.
- HAWKINS, L. L., Portland, Oregon.—Coal from Carbon River; gold from Pierce City, Idaho; a collection of twenty-five miscellaneous minerals.
- HILGARD, PROFESSOR E. W., Berkeley.—Bismuthinite from Colorado, and coal from Oregon.
- HILL, H. C., San Francisco.—Horn silver from Robert E. Lee Mine, Leadville, Colorado.
- HUBBON, F. W., San Diego, California.—Chalcopyrite from San Fernando Mine, Lower California; asbestos from San Diego County.
- JACOBS, G. B., Oakland.—Fahlerz from Wonder Mine, Inyo County.
- MCGILLIVRAY, J., Oakland.—Calcite from Oregon, and from Shasta County, California.
- MCMANUS, —, San Francisco.—Tennantite, calcocite, and magnetite from Arizona.
- MADEIRA, GEORGE, San Francisco.—Lintonite, limestone, and syenite from Volcano, Amador County.
- MUSGRAVE, —, Class '79.—Lime tufa from Lake Mono.
- NICHOLSON, —, Class '79.—Asbestos from Colfax.
- PRICE, THOMAS, San Francisco.—Cerussite from Eureka Mine, Nevada; cerussite with chalcodony, and cerussite with mimetisite, from Eureka Mine, Nevada.
- RICE, D. M., Santa Cruz.—"Rock soap," from Aptos, Santa Cruz County.
- RISING, W. B., Berkeley.—Aragonite and epsomite from Sulphur Bank Mine; metacinnabarite from Lake County, California.
- RIVERS, J. J., Berkeley.—Copper from Howell Mountain, Napa County; limonite from Calistoga; hematite from White Sulphur Springs Mine, Napa County; cinnabarite and pyrite from Phoenix Mine, Napa County; amygdulæ from Berkeley.
- ROWELL, E. F., Swansea, California.—Fahlerz and galena from Swansea.
- SESSIONS, MISS K. O., Oakland.—Cerussite from Flagstaff Mine, Utah.
- SHELDON, H. B., Corvelo, Shasta County.—Calcite from the Indian reservation at Corvelo.
- STEWART, W. F., Inyo County.—Thenardite from Esmeralda County, Nevada; chalcocite, fahlerz, chalcopyrite, chrysocolla, malachite, and azurite, from the Diana Mine, Mono County, California; arsenopyrite from Prescott District, Mono County; gold from Alida Valley, Mono County.
- SWEETAPPLE, MRS., San Francisco.—Turquoise, from Esmeralda, Nevada.
- TAGGERT, —, Oakland.—Galena, from Galena, Illinois; galena covered with pyrite, from same locality; cinnabarite, from Fresno county.
- TREADWELL, G. A.—Jarosite, Vulture Mine, Arizona; fluorite, from Metallic Candlestick Mine, Seymour, Arizona.
- VOY, C. D., San Francisco.—Aragonite, from Black Rock, Nevada; pyrrargyrite and specularite, from Prescott, Arizona.
- WALEN, F. H., Rocklin, California.—Quartz-encrusted bowlders and magnesite, from Alta, Placer County; opalized wood, from Rocklin; chalcopyrite, from Auburn; magnesite, from Dutch Flat; steatite, from Colfax; asbestos, from same place; marble from Bear River, west of Colfax; "glass sand," from Lincoln, Placer County; lignite, from same place; lignite, from Dutch Flat, Placer County.
- WYLIE, HENRY, Butte County, California.—Gold ore, from Butte County.

## TO THE MUSEUM OF PETROGRAPHY.

- GRIFFITH, G.—Granite, from Penryn, California.
- JACKSON, A. W., Berkeley.—Four hundred specimens of igneous rocks, collected in Napa, Solano, Sonoma, and Lake Counties, California, during the summer of 1879.
- RIVERS, J. J.—Forty specimens of basalt, trachyte, obsidian, etc., from Mount St. Helena; granite from Folsom, Penryn, Pino, and Rocklin.
- SHELDON, H. B., Corvelo, Shasta County, California.—Glaucophane syenite, sandstone, and serpentinite, from Indian Reservation at Corvelo.
- WALEN, F. H., Rocklin, California.—Granite, from Rocky Mountains; granite, from Penryn, California; "leopard rock," from Dutch Flat; diabase porphyrite, from Applegate; quartz diorite, from Middle Fork of Yuba; serpentinite, from Dutch Flat.

# FINANCIAL STATEMENTS.

## STATEMENT OF RECEIPTS

For the fiscal year ending June 30th, 1880.

### *Receipts from Endowments, Trust Funds, and State Appropriations.*

Land Fund, from sales of grant of 150,000 acres-----	\$46,932 06
Excess of payments-----	2,784 26
Brayton property mortgage notes (bills receivable)-----	5,618 75
State fees due Secretary of State on patents-----	75 00
Michael Reese donation-----	50,000 00
State appropriation for construction of Bacon Library building-----	\$25,000 00
State appropriation, balance of appropriation of \$40,000 for Mechanical Arts College building-----	1,597 40
State appropriation for Agricultural and Mechanical Departments, April 1st, 1878-----	10,000 00
H. D. Bacon's donation for Library and Art Gallery building-----	30,597 40
Michael Reese Library Fund, interest on loan to Hollister and others-----	25,000 00
	3,444 44
Total receipts from endowments, trust funds, and appropriations-----	\$170,451 91

### *Receipts Available for Current Expenses.*

Interest from Brayton property mortgage notes-----	\$5,682 11
Interest from Brayton Real Estate Fund, investment in bonds-----	1,815 00
Interest from balance of unpaid principal, agricultural grant of 150,000 acres-----	17,653 98
Interest from United States endowments, investment in bonds of Land Fund-----	21,606 56
Interest from forfeited seminary lands-----	128 00
Interest from seminary land, Investment Fund-----	1,140 00
Interest from State endowment from title lands-----	50,040 00
Land fees from certificates of purchase and patents-----	293 00
Cottage rents-----	1,350 00
Laboratory, from students for chemicals and apparatus-----	1,124 65
College celebrations, diploma fees-----	214 00
Library Fund, donation from Hon. H. H. Haight-----	100 00
Mechanical Department; Mining Department, fees from students for chemicals, etc.-----	99 19

Total receipts of income available for current expenses-----

\$89,216 49

Total Receipts-----

\$269,668 40

## STATEMENT OF DISBURSEMENTS AND INVESTMENTS

For the fiscal year ending June 30th, 1880.

*Disbursements and Investments for Account of Endowments, Trust Funds, and State Appropriations.*

## United States endowment (investment of Land Fund in bonds):

San Luis Obispo County bonds, par value-----	\$1,000 00
Premium on same, at 6½ per cent.-----	55 00
Premium on Yuba County bonds, par value \$12,000, to replace redeemed bonds, at 5¾ per cent.-----	690 00
Premium on San Luis Obispo County bonds, par value \$8,000, to replace redeemed bonds, at 10¼ per cent.-----	820 00
Premium on San Luis Obispo County bonds, par value \$2,000, to replace redeemed bonds, at 6½ per cent.-----	130 00
Deposit with savings banks, awaiting investment in bonds-----	10,495 82

\$13,200 83  
14,504 17

## Brayton Property Real Estate Fund, awaiting investment in bonds, deposited with savings banks-----

## Sundry Land Investment Fund:

Premium paid on San Luis Obispo bonds, par value \$8,000, to replace redeemed bonds, at 6¼ per cent.-----

520 00

Bills receivable, loan of Michael Reese donation for one year at 10 per cent.-----

50,000 00

Excess payments, \$1 25 per acre due the United States-----

5,324 65

State Geological Survey, insurance premium on material in New York-----

51 25

State fees for affixing State seal to patents-----

80 00

Bacon Library and Art Gallery building-----

1,275 60

Mechanical Art College building. Appendix A-----

1,539 39

Mechanical Department. Appendix B-----

1,368 73

Agricultural Department (to \$4,361 60 add Dwinelle's salary of \$900). Appendix C-----

5,261 60

Land Fund, returned to applicants for want of title-----

953 35

\$94,079 57

Total disbursements for account of endowment, trust funds, and State appropriations-----

*Disbursements from Income in Payment of Current Expenses.*

Salaries—Educational, \$68,119 92; Secretaries, etc., \$14,466 65-----

\$82,586 57

Equipment and repairs. Appendix D-----

922 26

Fuel-----

362 77

Carried forward-----

\$84,471 60

\$94,079 57

## STATEMENT OF DISBURSEMENTS AND INVESTMENTS—Continued.

Brought forward	\$84,471 60	\$94,079 57
Advertising and printing. Appendix E	465 92	
Telegraphing and expressing	400 32	
Stationery	65 25	
Postage	327 75	
Rent	600 00	
	122 24	
University printing office. Appendix F	1,196 11	
Land administration (\$300 paid E. F. Hastings included). Appendix G	920 05	
Incidental expenses. Appendix H	3,873 21	
University site improvements. Appendix I	1,724 85	
Insurance. Appendix J	536 75	
College celebrations. Appendix K	464 02	
Official and lecturing expenses	42 95	
Apparatus	79 12	
Museum. Appendix L	1,322 94	
Laboratory. Appendix M	1,911 61	
Library. Appendix N	250 00	
Contingent Fund	10 25	
Military Department	66 35	
Interest and discount	54 44	
Land interest, returned on canceled certificates of purchase	14 00	
Fee Fund, returned on canceled certificates of purchase	2 00	
Water rates	122 53	
Repairs of cottages. Appendix O	100 00	
Seminary Land Investment Fund interest, accrued interest on bonds purchased		
Total disbursements from receipts of available income	\$99,144 28	
Total disbursements and investments	\$193,223 85	

## DISBURSEMENTS.

APPENDIX A.—*Mechanical Arts College Building.*

Steam engine.....	\$500 00	
Cartage.....	13 50	
Turning lathes, etc.....	291 37	
Furnaces.....	180 00	
Freight.....	25 00	
Brick and lime for furnaces.....	54 25	
Tools.....	258 27	
Furniture.....	217 00	
		\$1,539 39

APPENDIX B.—*Mechanical and Mining Departments.*

Supplies for Mining Department.....	\$811 98	
Blacksmithing for Mining Department.....	10 87	
Labor on furnaces in Mining Department.....	32 00	
Mason work on furnaces in Mining Department.....	80 00	
Coke for Mining Department.....	31 47	
Cartage for Mining Department.....	15 00	
Hardware for Mining Department.....	10 40	
Apparatus for Mining Department.....	128 75	
Chairs for Mining Department.....	8 62	
Lumber for Mining Department.....	14 10	
Plumbing in Mining Department.....	7 10	
Blackboards for Mechanical Department.....	5 00	
Bench plates, rubbers, etc., for Mechanical Department.....	48 00	
Tools for Mechanical Department.....	90 09	
Draughting materials for Mechanical Department.....	75 35	
		\$1,368 73

APPENDIX C.—*Agricultural Department.*

Labor.....	\$3,450 40	
Labor on heating apparatus.....	36 75	
Furnace doors and bars for heating apparatus.....	7 75	
Tools and hardware.....	95 23	
Freight and expressage.....	111 19	
Lumber.....	33 70	
Grain and seeds.....	128 03	
Hay.....	31 50	
Blacksmithing.....	22 77	
Flower pots.....	42 22	
Wire cloth, squirrel, gopher, and mouse traps.....	5 15	
Japanese and other plants and trees.....	14 00	
Three gross negative glass.....	12 85	
Fifty burlap bags.....	4 50	
Show cases, sash, and stakes.....	45 50	
Lectures of E. J. Wickson.....	120 00	
Riddle, sieve, and brush.....	1 90	
Eleven barrels of lime.....	19 75	
Four and one half tons of coal for steam heater.....	47 25	
Shelf boxes.....	9 00	
Candles.....	20	
Wire cloth, needles, and French nails.....	3 85	
One sash and glazing.....	4 10	
Squirrel poison.....	75	
Two grass hooks.....	1 50	
Brooms, wrench, empty barrels and boxes.....	3 85	
Fifteen yards muslin.....	1 20	
Expenses in arranging exhibit at Mechanics' Fair.....	5 20	
One can coal oil.....	4 00	
One record book.....	80	
Three loads of sand.....	3 00	
Charges of Custom-house broker.....	10 65	
One stop-cock.....	1 25	
Tubing with cap.....	55	
Plumbers' material.....	4 85	
Amount carried forward.....		\$4,395 19



Amount brought forward .....	\$4,395 19	
One still .....	2 50	
Half dozen 8-ply M. board .....	1 00	
One paint brush .....	40	
Five gallons coal-tar, sprinkling pot, and grafting wax .....	2 55	
One smoothing harrow .....	17 00	
Chemicals, time and record books .....	5 75	
Empty barrels .....	3 50	
One scale beam .....	17 50	
Eight and one-fifteenth glass tubing .....	6 00	
Charcoal .....	8 80	
Chemicals .....	55	
Twelve glasses .....	1 50	
Traveling expenses of F. W. Morse .....	1 05	
Traveling expenses of W. Klee .....	6 60	
Twelve yards toweling .....	1 71	
		\$4,361 60

APPENDIX D.—*Equipment and Repairs.*

Plumbing, pipe, etc. ....	\$53 95	
Carpets and matting .....	224 40	
Hardware .....	170 74	
Lumber .....	46 08	
Glazing .....	51 36	
Brooms, dusters, etc. ....	74 58	
Stove and pipe .....	26 30	
Removing furniture .....	7 50	
Sheet copper, wire, and glass tubes .....	8 35	
Matches, turpentine, and oil .....	4 20	
Chair legs .....	4 50	
Paint .....	6 95	
Coal hods, grate and dust pans .....	15 00	
Marble slabs .....	4 00	
Binders' boards .....	2 75	
Bluestone .....	75	
Repairing furniture .....	38 25	
Repairing plastering, etc. ....	7 75	
Blackboards .....	5 00	
Ladders .....	10 60	
Desk .....	20 00	
Lithogram .....	5 00	
Draughting materials .....	12 95	
Expressage .....	11 10	
Supplies for Physical Laboratory .....	28 60	
Copper boiler for Physical Laboratory .....	67 00	
Surveying materials .....	4 60	
Shades for Gymnasium .....	10 00	
		\$922 26

APPENDIX E.—ADVERTISING AND PRINTING—*Printing.*

University Press, for printing bulletins, programimes, lists for library and museum, and class schedules .....	\$289 97	
<i>Advertising.</i>		
In sundry newspapers, commencement exercises, examinations, and proposals for fuel .....	175 95	
		\$465 92

APPENDIX F.—*University Printing Office.*

For printing press .....	\$50 00	
For type .....	40 40	
For galleys, furniture, leads, and slugs .....	9 54	
For type and rule .....	5 20	
For repairing press and roller box .....	3 50	
For felt blanket .....	7 80	
For printing material .....	5 80	
		\$122 24

APPENDIX G.—*Land Administration.*

Stationery .....	\$96 81	
San Francisco Directory .....	5 00	
Postage and Post Office box rent .....	21 35	
Chair cushions .....	2 50	
Fuel .....	13 00	
Amount carried forward .....	\$138 66	

Amount brought forward.....	\$138 66	
Janitor's salary.....	60 25	
Attorneys' fees.....	428 25	
Extra clerical services.....	288 05	
Land Agent's traveling expenses.....	164 00	
Fees and costs of suits.....	116 90	
		\$1,196 11

APPENDIX II.—*Incidental Expenses.*

Attorneys' fees.....	\$789 50	
Abstract of title to Brayton real estate.....	62 25	
Report of Water Commission, and map.....	15 00	
One hundred and fifty copies of Record-Union and mailing.....	8 30	
Extra pay to men at fire.....	10 00	
Extra clerical services.....	20 40	
Copying.....	1 00	
Notary fees.....	6 00	
San Francisco Directory.....	5 00	
Expenses of Recorder to San Francisco.....	2 60	
		\$920 05

APPENDIX I.—*University Site Improvements.*

Labor.....	\$3,140 75	
Feed for horses.....	73 98	
Liniment and oil.....	1 25	
Cement.....	2 25	
Shovels, pick handles, and nails.....	23 30	
Twelve loads of gravel and hauling.....	33 00	
Powder and fuse.....	99 50	
Stationery.....	3 70	
Coal oil, brooms, axe handles.....	5 10	
Grafting wax.....	30	
Trees.....	1 25	
Carpenter work.....	16 00	
Gas dies and screw plates.....	12 75	
Hay.....	10 00	
Blacksmithing.....	211 03	
Lumber.....	239 05	
		\$3,873 21

APPENDIX J.—*Insurance.*

Insurance premium on North and South Hall and Mechanical Arts College Building.....	\$1,607 20	
Insurance premium on cottages.....	83 25	
Insurance premium on barn.....	34 40	
		\$1,724 85

APPENDIX K.—*College Celebrations.*

Expenses of commencement day.....	\$164 75	
Diplomas, lettering the same, and ribbons.....	329 00	
Examination papers.....	43 00	
		\$536 75

APPENDIX L.—*Museum.*

Specimens and traveling expenses of Curator.....	\$19 95	
Chemicals.....	8 10	
Alcohol.....	12 25	
Freight bills and express charges.....	26 45	
Hardware.....	12 37	
		\$79 12

APPENDIX M.—*Laboratory.*

Chemicals.....	\$137 64	
Gasoline.....	244 30	
Acid apparatus—platinum retort, etc.....	458 50	
Charcoal.....	32 00	
Half yard of rubber cloth.....	1 50	
Freight and expressage.....	13 26	
Tubing, evaporating dishes, blow-pipes, etc.....	88 20	
One sheepskin.....	75	
Washing.....	1 50	
Sealing wax.....	2 62	
Glassware.....	221 32	
Acids.....	62 17	
Alcohol.....	37 90	

Amount carried forward..... \$1,301 66

Amount brought forward .....	\$1,301 66	
Rubber tubing .....	6 75	
Copper wire, sheet brass, etc. ....	5 13	
Brass screen .....	7 50	
Starch .....	90	
Morphine .....	1 00	
		\$1,322 94

APPENDIX N.—*Library.*

Purchase of books .....	\$1,601 86	
Purchase of periodicals and catalogues .....	231 72	
Card case and cards .....	63 93	
Freight .....	10 40	
Stationery .....	3 70	
		\$1,911 61

APPENDIX O.—*Repairs on Cottages.*

For kalsomining Cottage No. 2 .....	\$35 00	
For plumbing Cottage No. 2 .....	17 75	
For repairing Cottage No. 8 .....	65 00	
For hot water pipes in Cottage No. 1 .....	2 80	
For digging drains for Cottage No. 7 .....	2 00	
		\$122 55

## TRIAL BALANCE, JUNE 30TH, 1880.

## LEDGER ACCOUNTS.

*Debits.*

Cash deposit with Treasurer .....	\$90,381 03
Salaries .....	668,554 57
Equipment and repairs .....	34,569 56
Fuel, lights, and water .....	8,523 30
Advertising and printing .....	9,230 29
Telegraphing and expressing .....	2,222 78
Stationery .....	2,222 97
Postage and revenue stamps .....	1,654 66
Rent .....	7,367 00
Office expense .....	1,961 34
University printing office .....	2,776 09
Incidental expenses .....	4,930 24
Bills receivable .....	105,312 60
University site improvement .....	40,101 12
Agricultural department .....	39,283 13
University Water Company .....	6,148 50
Students' cottages .....	26,823 11
Brayton property .....	1,592 88
Building Fund .....	357,396 37
Tompkins endowment .....	148 60
Toland Medical College .....	490 83
Preparatory department .....	2,045 39
Free scholarship .....	5,499 99
Insurance .....	13,906 31
College celebrations .....	5,677 01
Official and lecturing expenses .....	5,870 18
Apparatus .....	22,450 43
Museum .....	4,828 58
Laboratory .....	7,421 37
Library .....	22,291 44
Contingent Fund .....	1,025 00
Labor Contingent Fund .....	1,000 00
Mechanical department .....	34,345 07
United States endowment (investment of Land Fund) .....	385,000 00
San Francisco Savings Union .....	26,683 00
Security Savings Bank .....	33,501 55
Union Savings Bank, Oakland .....	39,028 60
Seminary Land Fund investment .....	19,900 00
Brayton Real Estate Fund .....	30,583 23
Hibernia Savings and Loan Society of San Francisco .....	5,815 71
Oakland Bank of Savings, Oakland .....	5,878 10
Military department .....	2,505 13
Mechanical Arts College Building .....	46,716 80
Bacon Library building .....	1,275 60
Total .....	\$2,134,939 56

## TRIAL BALANCE—Continued.

*Credits.*

Land administration .....	\$22,871 20
College of California .....	2,552 46
Interest and discount .....	51,008 20
Land Fund .....	423,504 81
Land interest .....	217,714 95
Fee Fund .....	9,819 50
Excess payments .....	41,288 63
Water rates .....	3,151 35
University Fund .....	290,281 00
State appropriation .....	241,424 01
State endowment interest .....	309,788 37
Admission and tuition fees .....	2,095 00
Rent from students' cottages .....	6,975 54
State geological survey .....	454 63
United States endowment interest .....	79,707 56
Seminary Land Fund .....	505 99
Seminary Land Fund interest .....	698 48
Forfeited seminary land principal .....	480 00
Forfeited seminary land interest .....	866 82
Forfeited seminary land fees .....	16 00
Audited demands on Controller .....	338,298 30
Certificates of deposit .....	
Agassiz Professorship of Oriental Languages .....	1,216 73
Medal Fund (donation) .....	2,749 95
Engineering Department Fund (donation) .....	108 38
Land Agent of University .....	723 02
Special Investment Fund interest .....	1,465 50
Seminary Land Fund interest .....	3,291 50
Brayton Real Estate Fund interest .....	3,424 24
State fees .....	13 00
M. Reese Library Fund .....	50,000 00
M. Reese Library Fund interest .....	3,444 44
H. D. Bacon (donation) .....	25,000 00
Total .....	\$2,134,939 56

## STATEMENT OF CASH ASSETS AND LIABILITIES, JUNE 30TH, 1880.

<i>Assets.</i>		
Land Fund—deposit with Treasurer .....	\$19,012 04	
Brayton property Real Estate Fund—deposit with Treasurer .....	1,272 50	
State Geological Survey—deposit with Treasurer .....	454 63	
State Fees—deposit with Treasurer .....	13 00	
Bacon Library and Art Gallery Building—deposit with Treasurer .....	48,724 40	
General Fund—deposit with Treasurer .....	20,904 46	
Cash balances with Treasurer, June 30th, 1880 .....		\$90,381 03
<i>Advances.</i>		
Seminary Land Investment Fund .....	\$433 05	
Seminary Land Investment Fund Interest. Accrued in't on bonds .....	100 00	
United States Endowment Fund Interest. Accrued in't on bonds .....	37 50	
Excess payments .....	2,873 87	3,444 42
<i>Deposits.</i>		
With Union Savings Bank, of Oakland .....	\$18,500 00	
With Oakland Bank of Savings, of Oakland .....	5,000 00	
With Security Savings Bank, of San Francisco .....	28,162 50	
With San Francisco Savings Union, of San Francisco .....	12,500 00	
With Hibernia Savings and Loan Society, of San Francisco .....	5,000 00	69,162 50
Total cash assets .....		\$162,987 95
<i>Liabilities.</i>		
Amount due United States for excess of \$1 25 per acre .....	\$41,288 63	
Amount due Brayton Real Estate Fund—await'g investm't in bonds .....	15,776 67	
Amount due United States Endowment—await'g investm't in bonds .....	42,402 97	
Amount due State Geological Survey Fund .....	454 63	
Amount due Bacon Library and Art Gallery Fund .....	48,724 40	
Amount due Secretary of State—fees on patents .....	13 00	
Amount due unpaid bills .....	239 71	
Total cash liabilities .....		148,900 01
Excess of cash assets over liabilities .....		\$14,087 94
BERKELEY, June 30th, 1880.		

## INVESTMENT OF LAND FUND.

For account of United States Endowment of 150,000 acres of Agricultural Lands, for the fiscal year ending June 30th, 1880.

Date of purchase	DESCRIPTION OF BONDS.	Number of bonds	Denomination	Par value	Rate of purchase	Amount paid	Rate of interest	Amount of annual interest
1880. April 5.	San Luis Obispo County bonds, interest payable semi-annually, on the 1st of January and July of each year; mature June 30th, 1882 .....	10	\$100 00	\$1,000 00	106½	\$1,065 00	10 pr. ct.	\$100 00

Deposited in State treasury to the credit of the "Consolidated Perpetual Endowment Fund of the University of California," June 30th, 1880.

## THE UNIVERSITY MEDAL FUND.

Dr.		Deposited with the Union Savings Bank, Oakland, California.		Cr.	
1874.			1873.		
July 30	To cash—Medal to F. Otis	\$125 00	March 13.	By donations	\$2,383 68
Oct. 10	To cash—Medal to J. M. Whitworth	125 00	June 30	By interest	56 05
Oct. 10	To cash—Medal to F. H. Whitworth	125 00	Dec. 31	By interest	121 48
1875.			1874.		
July 16	To cash—Medal to T. F. Barry	125 00	June 30	By interest	126 99
1876.			Dec. 31	By interest	115 79
Nov. 30	To cash—Medal to D. B. Huntley	125 00	1875.		
Nov. 30	To cash—Medal to F. L. Button	125 00	June 30	By interest	114 41
		\$750 00	Dec. 31	By interest	114 86
1878.			1876.		
June 30	To balance	2,736 62	June 30	By interest	119 37
		\$3,486 62	1877.		
1878.			Jan. 31	By interest	115 13
Oct. 31	To cash—Medal to Theodore Gray	\$125 00	July 30	By interest	112 40
Oct. 31	To cash—Medal to Jos. Hutchinson	128 50	1878.		
1879.			Jan. 31	By interest	106 46
June 30	To balance	2,685 45			
		\$2,938 95			
1879.			1878.		
Aug. —	To cash—Medal to Fremont Morse	\$128 50	June 30	By balance	\$2,736 62
1880.			July 31	By interest	103 74
June 30	To balance	2,749 95	1879.		
		\$2,878 45	Jan. 31	By interest	98 59
			1879.		
			June 30	By balance	\$2,685 45
			July 31	By interest	100 04
			1880.		
			Jan. 31	By interest	92 96
			1880.		
			June 30	By balance	\$2,749 95

## THE AGASSIZ PROFESSORSHIP FUND.

Dr. *Deposited with the Union Savings Bank, Oakland, California.* Cr.

1876.			1873.		
June 30--	To balance -----	\$485 56	March 13.	By cash from rent -----	\$100 00
			June 30--	By interest -----	2 35
			Dec. 31--	By interest -----	5 05
			1874.		
			June 30--	By interest -----	6 08
			Aug. 19--	By cash from rent -----	100 00
			Nov. 14--	By cash from rent -----	100 00
			Dec. 31--	By interest -----	9 27
			1875.		
			June 30--	By interest -----	15 22
			Dec. 11--	By cash from rent -----	125 00
			1876.		
			June 30--	By interest -----	22 60
1877.					
June 30--	To balance -----	\$485 56			\$485 56
		\$679 09	1876.		
			June 30--	By balance -----	\$485 56
			Dec. 18--	By rent -----	125 00
			1877.		
			June 30--	By interest -----	68 53
1878.					
June 30--	To balance -----	\$679 09			\$679 09
			1877.		
			June 30--	By balance -----	\$679 09
			1878.		
			Jan. 31--	By interest -----	28 64
			March 31	By rent -----	125 00
1879.					
June 30--	To balance -----	\$832 73			\$832 73
		\$1,020 90	June 30--	By balance -----	\$832 73
			July 31--	By interest -----	30 60
			1879.		
			Jan. 31--	By interest -----	32 57
			May 31--	By rent -----	125 00
		\$1,020 90			\$1,020 90
1880.			1879.		
June 30--	To balance -----	\$1,216 73	June 30--	By balance -----	\$1,020 90
			July 31--	By interest -----	34 14
			1880.		
			Jan. 31--	By interest -----	36 69
			June 30--	By rent -----	125 00
		\$1,216 73			\$1,216 73
			1880.		
			June 30--	By balance -----	\$1,216 73

## REPORT OF THE LAND AGENT OF THE UNIVERSITY OF CALIFORNIA.

LAND OFFICE OF THE UNIVERSITY, SAN FRANCISCO, June 30th, 1880.

*To the Honorable the Board of Regents of the University of California:*

GENTLEMEN: The transactions of the Land Department of the University for the fiscal year ending June 30th, 1880, also statements of total cash sales of the grant, deferred payments due, and number of acres located, is herewith respectfully submitted:

<i>Receipts for the fiscal year ending June 30th, 1880.</i>		
From sales of the Agricultural Grant of 150,000 acres -----	\$46,932 06	
From collections of \$1 25 per acre due the United States for double minimum lands -----	2,784 26	
From interest on deferred payments due Agricultural Grant -----	17,653 99	
From fees for applications, certificates of purchase, and patents -----	293 00	
From interest on deferred payments due forfeited Seminary lands -----	128 00	
From State tax due the State of California for affixing the seal of State patents -----	75 00	\$67,866 31
Number of acres for which certificates of purchase have been issued -----	80.00	
Number of acres for which patents have been issued for minimum lands -----	1,772.96	
Number of acres for which patents have been issued for double minimum land -----	5,030.56	
<i>Total delinquencies of payments.</i>		
On approvals -----	\$12,394 25	
Delinquent interest on certificates of purchase -----	24,871 84	\$37,266 09
<i>Total sales of the Agricultural Grant of 150,000 acres, from April 19th, 1869, to June 30th, 1880, inclusive.</i>		
	Number of acres.	Amount paid.
Sales of land at \$6 25 per acre, payment in full -----	28,378.20	\$142,610 93
Sales of land at \$5 00 per acre, payment in full -----	30,308.71	151,544 05
Sales of land at \$5 00 per acre, 20 per cent of principal paid -----	43,549.26	43,549 26
Installments of principal paid on \$5 land on which 20 per cent was paid -----		47,294 43
Sales of land at \$6 25 per acre, 20 per cent of principal and excess paid -----	7,392.72	7,392 72
Sales of land at \$6 25 per acre, 20 per cent of principal and full excess paid -----	23,225.08	23,225 08
Installments paid on land, principal of same -----		8,841 69
Forfeiture of deposit of 20 per cent by applicant for 200 acres -----		200 00
Totals -----	132,853.97	\$424,658 16
<i>Statement of lands listed and charged against the Agricultural Grant of 150,000 acres.</i>		
San Francisco District -----	47,199.27	
Sacramento District -----	6,296.60	
Los Angeles District -----	7,463.68	
Stockton District -----	9,330.30	
Humboldt District -----	13,707.38	
Shasta District -----	18,017.25	
Visalia District -----	13,729.49	
Marysville District -----	22,074.27	
Susanville District -----	1,257.53	
Aurora District -----	1,920.65	
Independence District -----	1,360.00	
Total acres listed -----	142,356.42	

NOTE.—During the past fiscal year, of the above listed lands, 5,122.56 acres were canceled. Of lands not listed, there were also canceled 10,006.16 acres, making a total cancellation of 15,128.72 acres.

J. HAM. HARRIS, Land Agent.



## STATEMENT OF PATENTS ISSUED

*By the University of California, to June 30th, 1880.*

Date of patent.	Number of patent.	Number of location.	Name of patentee.	Minimum land.	Double Minimum land.
1872.					
April 29	1	201	Isaac Friedlander	2,720.00	
Dec. 30	2	48	H. H. Warburton	80.00	
Dec. 30	3	48	Newton J. D. Shartzler	120.00	
1873.					
Jan. 7	4	287½	W. W. Hayes, H. Loobliner, and W. R. Palmer, Trustees of Chorro Lodge, No. 168, I. O. O. F.	40.00	
Jan. 7	5	190	Joseph M. Wood	321.90	
April 21	6	296	L. D. Latimer	40.00	
1874.					
Aug. 5	7	104	F. C. Davis	160.00	
Aug. 5	8	560	Albert Dibble	40.00	
Aug. 5	9	22	Joseph Naphtaly	640.00	
Sept. 22	10	313	Martin A. Britton	231.65	
Sept. 28	11	179	Patrick Nolan	160.00	
Sept. 28	12	180	Patrick Nolan	160.00	
Sept. 28	13	302	Patrick Nolan	160.00	
Oct. 10	14	862	Joseph A. Carrie	76.60	
Oct. 19	15	792	Charles A. Perkins	40.00	
Nov. 28	16	343	Jacob McKissick	80.00	
Dec. 28	17	374	J. W. Haverstick	160.00	
1875.					
Jan. 7	18	883	David N. Sherburn	160.00	
Jan. 4	19	408	Charles Camden and Wm. Magee		360.00
Jan. 7	20	532	John Ellis and Erastus Wagoner		80.00
Jan. 16	21	181	Elkan Wasserman	160.00	
Jan. 19	23	539, 637, 639, 40, 41, 42	R. G. Byxbee	360.00	
Feb. 3	24	392	Frederic Clay	280.00	
Jan. 23	25	602	Charles P. Potter	40.00	
Jan. 26	26	868	A. J. Forrister	40.00	
Feb. 10	27	1110	R. G. Flint	40.00	
March 9	28	1122	J. P. Andrews	40.00	
April 22	29	625, 892	Mendocino Lumber Company	400.00	
May 11	30	332	Winford S. Whitaker	40.00	
July 19	31	344	Jefferson Walker	640.00	
Aug. 3	32	520	Lindsey Carson	40.00	
Aug. 3	33	1208	Christopher Nelson	40.00	
Aug. 16	34	521, 523	Lindsey Carson	200.00	
Sept. 24	35	667	W. H. Rogers		54.51
Nov. 2	36	298	Andrew Gehringer	219.39	
1876.					
Feb. 2	37	184	Stephen G. Little	160.00	
Feb. 2	38	575	Isaac Rambo	40.00	
Feb. 2	39	103	Lewis Tryon	160.00	
Feb. 19	40	952	Albert Dibble	155.74	
April 14	41	671	Elon W. Root		40.00
June 24	42	136	August Hemme	40.00	
June 24	43	579	W. W. Hayes	42.00	
June 24	44	1294	Silas Coombs	40.00	
Aug. 26	45	678	Hosea H. Johnson	80.00	
Sept. 7	46	638	Robert G. Byxbee	40.00	
Oct. 20	47	542	A. B. Forbes	80.00	
Dec. 27	48	382	W. McReynolds	160.00	
1877.					
Jan. 5	49	353	S. A. Gyle	40.00	
Feb. 19	50	1173	R. E. Jacks	40.00	
April 16	51	840	Archilles S. Hicks	40.00	
Aug. 13	52	1041	John T. Harrington		76.26
Aug. 13	53	291	John Hienlan		40.00
Aug. 13	54	388	F. R. Farman		123.65

Date of patent.	Number of patent.	Number of location.	Name of patentee.	Minimum land.	Double Minimum land.
Aug. 15	55	265	C. D. Robinson	40.00	
Oct. 27	56	438	Alexander Ash		40.00
Oct. 27	57	451	A. S. C. Cleek		40.00
Nov. 12	58	169	B. B. Redding		160.00
Dec. 18 1878.	59	282	William T. Coleman	40.00	
Jan. 18	60	881	S. C. Stovall, assignee	160.00	
Jan. 18	62	1040	William T. Garrett	40.00	
Jan. 18	63	1270	George C. Berry	40.00	
Jan. 31	64	964	J. W. Johns	40.00	
Jan. 31	65	310, 333	L. W., J. C., and J. L. Harl	440.00	
Jan. 31	66	1360	George C. Berry	80.00	
Feb. 4	67	1142	J. C. Stovall, assignee	120.00	
Feb. 4	68	334, 362	Francis Boardman	200.00	
Feb. 4	69	243, 240, 241	William T. Coleman, assignee of John P. Nelson		657.49
Feb. 4	70	239	William T. Coleman		320.00
Feb. 6	71	1202, 1203, 1204	Commercial and Savings Bank of San José, assignee of Mark Howell	2,000.00	
Feb. 9	73	1089, 1090, 1091, 1092, 1093, 1095, 1097, 1098, 1099, 1094, 1096, 1126, 1127, 1128	James B. Haggin, assignee	1,530.00	4,230.66
Feb. 25	75	1278, 1281	E. J. Baldwin		546.91
March 18	76	1136	Joseph Russ	400.00	
April 6	77	1177	R. E. Jack	40.00	
April 15	78	1368	Richard S. Floyd et al., Trustees of the James Lick Trust	191.49	
April 18	79	1239	Robert Tait	40.00	
April 24	80	373	J. J. Chandon, assignee of J. W. Brim	80.00	
April 24	81	652	Joseph J. Chandon	40.00	
May 21	82	1109	Edward Kruse, assignee	60.43	
June 17	83	390	Lydia M. Carter	160.00	
July 11	84	279, 285	Thomas J. Price		274.12
Aug. 21	85	318	Peter Murray, assignee	80.00	
Aug. 21	86	1318	Joseph Getz	40.00	
Aug. 29	87	984, 985	O. W. Merriam, by virtue of a certain Sheriff's deed, dated Jan. 11, 1878	280.00	
Aug. 29	88	1359	O. W. Merriam, by virtue of a deed signed by Amelia Burrage, adm'x	82.32	
Oct. 26	89	91	Charles Wood	160.00	
Oct. 26	90	1395	Theodore Leroy	40.00	
Oct. 30	91	365	Alfred F. Green	240.00	
1879.					
Jan. 2	92	926	Mark Hubbard, assignee	40.00	
Jan. 2	93	389	John Murphy		80.00
Feb. 18	94	1137	Joseph Russ	40.00	
Feb. 18	95	1039	H. J. Holmes	80.00	
March 12	96	564	James Turnstead	40.00	
March 12	97	1009	Ann Alexander, assignee	40.00	
March 12	98	385, 386	Stephen Rees	160.00	
March 18	99	356	Jackson Hart, assignee	80.00	
May 29	100	618	Thomas Newell, assignee		320.00
June 6	101	1325	August Hemme	40.00	
June 6	102	295	B. F. Langford		40.00
June 6	103	769	Richard T. Pope		78.83
June 6	104	891, 972, 973	M. Brandenstein		520.50
June 6	105	692	Deming Gibbons		40.00
June 6	106	782, 672, 1168, 1168½	John Touhy		360.00
July 1	107	525	L. Godchaux		320.00
July 1	108	1283	Edward McDonough		40.00
July 1	109	355	Samuel Danville		160.00
July 1	110	369	David H. Allen		40.00
July 1	111	410	D. N. Friesleben		36.82

Date of patent.	Number of patent.	Number of location.	Name of patentee.	Minimum land.	Double Minimum land.
July 1	112	418, 511	G. W. Murdock		240.00
July 1	113	422	Thomas J. Kirkpatrick		480.00
July 1	114	433	Cynthia E. Sanborn		40.00
July 1	115	437	M. A. Reager		80.00
July 1	116	488	C. B. Ashurst		48.00
July 1	117	500	Thomas M. McClanahan		80.00
July 1	118	501, 709, 503, 507, 508	Wm. B. Parker & Francis Houghton		1,536.67
July 1	119	529	F. R. Lofton, assignee of Eli Hacker		80.00
July 1	120	582	E. R. Lowe, assignee of G. W. Hiatt		35.89
July 1	121	590, 591	Richard M. Sparks		80.00
July 1	122	924	James L. Wiebur		80.00
July 1	123	1014	C. P. Berry		80.00
July 1	124	1035	James H. Street		80.00
July 1	125	1141	Jno. Finnell, assignee of J. Finnell		80.00
July 1	126	1474	G. G. Briggs		160.00
July 1	127	616	Edward Hallett		7.40
July 2	128	192, 194	Thompson, Patchett & Grierson, Trustees, etc.	321.25	
July 2	129	588	Thompson, Patchett & Grierson, Trustees, etc.	40.00	
July 31	130	653	John F. Herrick	80.00	
Aug. 7	131	1404	W. J. Hildreth	81.32	
Aug. 7	132	986	Jas. Neylan, assignee W. H. Bias	80.00	
Aug. 13	133	513, 690	C. Burrell, assignee F. Hutchinson	80.00	
Sept. 2	134	610	Wm. Leviston, assignee B. H. Brooks	38.45	
Sept. 19	135	1282	Miller & Lux, assignees	120.00	
Oct. 18	136	245	W. T. Coleman, assignee L. D. Simpson		160.00
Oct. 21	137	1214, 1291	John M. Neville		111.10
Oct. 21	138	251	H. Block, assignee C. G. Boekius		40.00
Oct. 21	139	824	J. H. Logan	160.00	
Oct. 21	140	592, 793, 794	Gardiner, Pugh & Haddiek, assignees E. Bevan	160.00	
Oct. 21	141	1449	Mrs. Allie M. Pearson, assignee George H. Perrin		80.00
1880.					
Jan. 17	142	770	A. L. Huyck		40.00
Jan. 17	143	597	William McKee		12.22
Jan. 17	144	535	John Sites	40.00	
Jan. 17	145	581, 907	Julius Weyand	160.00	
Jan. 17	146	1383	Frederick Bohn	40.00	
Jan. 17	147	522	L. Carson, assignee W. W. Johnston	80.00	
Jan. 17	148	1111	Jeremiah Morgan		40.00
Jan. 17	149	1151½	Santa Clara Valley Mill and Lumber Co., assignees		40.00
Jan. 17	150	1373	Matthew, Aaron, and Abraham Kiser, assignees	34.21	
Jan. 17	151	841, 646, 1002, 1003, 595	Santa Clara Valley Mill and Lumber Company, assignees		402.46
Jan. 23	152	307	Charles S. Lohse	47.41	
Jan. 24	153	372	James Lydon	40.00	
Feb. 9	154	1129	E. L. Bradley		160.00
Feb. 9	155	445	Ambrose Lyall		160.00
Feb. 9	156	414	R. McEnespy	10.32	
Feb. 19	157	1370, 1377	Higgins & Collins, assignees	160.00	
				1,772.96	5,030.56

Number of acres of minimum land patented by the University..... 18,004.48  
Number of acres of double minimum land patented by the University..... 12,513.49

Total number of acres patented..... 31,517.97

J. HAM. HARRIS, Land Agent.

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STATE VITICULTURAL COMMISSION.

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FIRST ANNUAL REPORT

OF THE

BOARD OF STATE VITICULTURAL COMMISSIONERS.

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SECOND EDITION—REVISED.

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# OFFICERS AND MEMBERS

OF THE

## BOARD OF STATE VITICULTURAL COMMISSIONERS.\*

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ARPAD HARASZTHY, President,

*Commissioner for the San Francisco District.*

CHAS. A. WETMORE, Vice-President,

*Commissioner for the State at Large.*

CHAS. KRUG, Treasurer,

*Commissioner for the Napa District.*

I. DeTURK.....Commissioner for the Sonoma District.

R. B. BLOWERS.....Commissioner for the Sacramento District.

GEORGE WEST.....Commissioner for the San Joaquin District.

L. J. ROSE.....Commissioner for the Los Angeles District.

G. G. BLANCHARD.....Commissioner for the El Dorado District.

J. DeBARTH SHORB.....Commissioner for the State at Large.

JOHN H. WHEELER, Secretary.

CHAS. A. WETMORE,

*Chief Executive Viticultural and Health Officer.*

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### STANDING COMMITTEES.

*Executive*.....CHAS. A. WETMORE, GEO. WEST, and I. DeTURK.

*Auditing*.....R. B. BLOWERS.

*Finance*.....L. J. ROSE and J. DeBARTH SHORB.

### *Phylloxera, Vine Pests, and Diseases of the Vine:*

I. DeTURK, GEO. WEST, CHAS. KRUG, R. B. BLOWERS, and CHAS. A. WETMORE.

### *On Conference with Board of Regents of State University:*

ARPAD HARASZTHY, CHAS. A. WETMORE, and CHAS. KRUG.

### *On Instructions for the Office of the Chief Executive Viticultural Officer:*

ARPAD HARASZTHY, CHAS. KRUG, and I. DeTURK.

### *On Horticulture:*

GEO. WEST, R. B. BLOWERS, and J. DeBARTH SHORB.

### *On Distillation, Counterfeits, and Adulterations:*

J. DeBARTH SHORB, CHAS. KRUG, and GEO. WEST.

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### *Offices of the Board:*

NO. 111 LEIDESDORFF STREET, SAN FRANCISCO.

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\*Revised for second edition of this report, according to changes made since the publication of the first edition.

# OFFICERS AND MEMBERS

## OF THE

### STATE BOARD OF HORTICULTURAL COMMISSIONERS.

CHARLES A. DWINELLE, President,  
*Commissioner for the State at Large.*

W. W. SMITH	Commissioner for the Napa District.
M. T. BREWER	Commissioner for the Sacramento District.
W. B. WEST	Commissioner for the San Joaquin District.
FELIX GILLET	Commissioner for the El Dorado District.
ALBERT S. WHITE	Commissioner for the Los Angeles District.
S. F. CHAPIN	Commissioner for the San Francisco District.
A. CADWELL	Commissioner for the Sonoma District.
MATTHEW COOKE	Commissioner for the State at Large.
CHARLES H. SHINN	Commissioner for the State at Large.
ELLWOOD COOPER	Commissioner for the State at Large.

JOHN H. WHEELER, Secretary.

MATTHEW COOKE,  
*Chief Executive Horticultural and Health Officer.*

#### STANDING COMMITTEES

ON THE OCCURRENCES AND RAVAGES OF AND REMEDIES AGAINST INSECT PESTS :

<i>On Citrus Trees</i>	ALBERT S. WHITE.
<i>On Olive Trees</i>	ELLWOOD COOPER.
<i>On Deciduous and Ornamental Trees</i>	S. F. CHAPIN.
<i>On the Codling Moth</i>	MATTHEW COOKE and FELIX GILLET.
<i>On Red Spider, Mites, etc.</i>	W. B. WEST.
<i>On Fruit Packages</i>	W. W. SMITH and W. B. WEST.
<i>On Transportation and Quarantine</i>	CHAS. H. SHINN and MATTHEW COOKE.
<i>On Rules and Regulations</i>	CHARLES H. DWINELLE.
<i>On Conference with Shippers and Commission Merchants</i>	M. T. BREWER.
<i>On Borers Injurious to Fruit and Fruit Trees</i>	FELIX GILLET.

*Offices of the Board:*

No. 111 LEIDESDORFF STREET, SAN FRANCISCO.

# ACTS OF THE LEGISLATURE.

## CHAPTER LXII.

*An Act for the Promotion of the Viticultural Industries of the State.*

[Approved April 15, 1880.]

*The People of the State of California, represented in Senate and Assembly, do enact as follows :*

SECTION 1. There shall be appointed by the Governor a Board of State Viticultural Commissioners, to consist of nine members, two to be appointed from the State at large, and one to be appointed from each of the seven viticultural districts, which shall be constituted as follows :

*First*—The Sonoma District, which shall include the Counties of Sonoma, Marin, Lake, Mendocino, Humboldt, Del Norte, Trinity, and Siskiyou.

*Second*—The Napa District, which shall include the Counties of Napa, Solano, and Contra Costa.

*Third*—The San Francisco District, which shall include the City and County of San Francisco, and the Counties of San Mateo, Alameda, Santa Clara, Santa Cruz, San Benito, and Monterey.

*Fourth*—The Los Angeles District, which shall include the Counties of Los Angeles, Ventura, Santa Barbara, San Luis Obispo, San Bernardino, and San Diego.

*Fifth*—The Sacramento District, which shall include the Counties of Sacramento, Yolo, Sutter, Colusa, Butte, Tehama, and Shasta.

*Sixth*—The San Joaquin District, which shall include the Counties of San Joaquin, Stanislaus, Merced, Fresno, Tulare, and Kern.

*Seventh*—The El Dorado District, which shall include the Counties of El Dorado, Amador, Calaveras, Tuolumne, Mariposa, Placer, Nevada, Yuba, Sierra, Plumas, Lassen, Modoc, Alpine, Mono, and Inyo.

SEC. 2. The Commissioners, excepting the two appointed from the State at large, shall be residents of the districts from which they are appointed, and shall be specially qualified by practical experience and study in connection with the industries dependent upon the culture of the grapevine in this State. They shall each hold office for the term of four years, excepting that, of the nine first appointed, four, to be determined by lot, shall retire at the end of two years, when their successors shall be appointed by the Governor.

SEC. 3. The Board shall elect from among their own number a President, a Vice-President, and a Treasurer, and they shall appoint a Secretary, who shall not be one of their number, and whose salary shall not exceed one hundred dollars per month. And the Board shall determine and fix the amount of bonds that shall be given by the Treasurer and Secretary for the faithful performance of their duties.

SEC. 4. It shall be the duty of the Board to meet semi-annually to consult and to adopt such measures as may best promote the progress of the viticultural industries of the State. It shall be their duty to select and appoint competent and qualified persons to deliver at least one lecture each year in each of the viticultural districts named in section one of this Act, for the purpose of illustrating practical viticultural topics, and imparting instruction in methods of culture, pruning, fertilizing, fermenting, distilling, and rectifying, treating diseases of the vine, raisin drying, etc., for the better instruction of the people interested therein, as the requirements of each district may show to be necessary and important, and to disseminate all such useful knowledge relating to viticulture, by printed documents or correspondence, as may be within their power to do. The Board shall devote especial attention to the study of the phylloxera and other diseases of the vine, and shall make such recommendations in their semi-annual reports as they may deem best for the protection of vineyards.

SEC. 5. The Commissioners constituting the Board shall serve without compensation, and shall be allowed only their actual transportation expenses to and from their places of residence when attending the semi-annual meetings of the Board.

SEC. 6. The office of the Board shall be in the City of San Francisco, and shall be kept open to the public, subject to the rules of the Board, every day, excepting legal holidays, and shall be in charge of the Secretary during the absence of the Board.

SEC. 7. It shall be the duty of the Secretary to attend all regular meetings of the Board, and to preserve records of proceedings and correspondence; to collect books, pamphlets, periodicals, and other documents containing valuable information relating to viticulture, and to preserve the same; to collect statistics, and other information, showing the actual condition and progress of viticulture in this State, and elsewhere; to collect information concerning lands suitable for



viticulture, and to impart to the public, upon proper demands being made, information concerning the localities of such lands, prices, cost of cultivation, and means of transportation; *provided*, that he shall receive no fees for such services; to correspond with agricultural and viticultural societies, colleges, and schools of agriculture, and other persons and bodies, political or private, and disseminate information, printed or otherwise, as he may be directed by the Board of Commissioners; and to prepare, as required by the Board, semi-annual reports for publication.

SEC. 8. And for the further promotion of viticultural interests, it shall be the duty of the Board of Regents of the University of California to provide special instruction to be given by the Agricultural Department of the University in the arts and sciences pertaining to viticulture, the theory and practice of fomentation, distillation, and rectification, and the management of cellars, to be illustrated by practical experiments with appropriate apparatus; also, to direct the Professor of Agriculture, or his assistant, to make personal examinations and reports upon the different sections of the State adapted to viticulture; to examine and report upon the woods of the State procurable for cooorage, and the best methods of treating the same; and to make analyses of soils, wines, brandies, and grapes, at the proper request of citizens of the State; also, to prepare a comprehensive analysis of the various wines and spirits produced from grapes, showing their alcoholic strength and other properties, and especially any deleterious adulterations that may be discovered. The Regents shall also cause to be prepared, printed, and distributed to the public, quarterly reports of the Professor in charge of this work, relating to experiments undertaken, scientific discoveries, the progress and treatment of the phylloxera, and other diseases of the vine, and such other useful information as may be given for the better instruction of viticulturists.

SEC. 9. The Board of Regents of the University shall be authorized to receive and accept donations of lands suitable for experimental vineyards and stations, and shall submit in their next annual report an economical plan for conducting such vineyards, and for the propagation and distribution of specimens of all known and valuable varieties of grapevines.

SEC. 10. There is hereby appropriated, for the purposes mentioned in this Act, the sum of seven thousand dollars, to be apportioned as follows: For the necessary and contingent expenses of the Board of State Viticultural Commissioners, four thousand dollars, and for the University of California, three thousand dollars; and the State Controller shall draw his warrants upon the State Treasurer in favor of the Treasurers of the said Board of State Viticultural Commissioners, and of the University of California, for the amounts of four thousand and three thousand dollars respectively, as hereby appropriated, upon proper demand being made for the same; *provided*, that the said Board of State Viticultural Commissioners shall, in the month of December, submit to the Governor annual statements, duly verified by the oaths of the President and Treasurer, and attested by the Secretary of said Board, showing in detail the manner in which moneys received from the State have been expended, and also the amount remaining unexpended, together with an estimate of expenses for the ensuing year, beginning on the first day of July next thereafter.

SEC. 11. This Act shall take effect and be in force from and after its passage.

## CHAPTER LI.

*An Act to define and enlarge the duties and powers of the Board of State Viticultural Commissioners, and to authorize the appointment of certain officers, and to protect the interests of horticulture and viticulture.*

[Approved March 4th, 1881.]

*The People of the State of California, represented in Senate and Assembly, do enact as follows :*

SECTION 1. The Board of State Viticultural Commissioners, in addition to the duties and powers provided for by the Act entitled "An Act for the promotion of viticultural industries of the State," approved April fifteenth, eighteen hundred and eighty, shall, in respect to diseases of grapevines and vine pests, constitute a Board of Health. It shall, in addition to laboratory work, cause practical experiments to be made to determine or demonstrate the utility of known and new remedies against such diseases and pests.

SEC. 2. The Board shall elect of their own number, or appoint from without their number, a competent person to serve as Chief Executive Viticultural Officer, who shall perform also the duties of Viticultural Health Officer, under direction of said Board, and subject to removal from such office at any time by the Board.

SEC. 3. The Viticultural Health Officer shall have power, subject to the approval of the Board, to prevent the spread of vine diseases and vine pests, by declaring and enforcing rules and regulations in the nature of quarantine, to govern the manner of, restrain, or prohibit the importation into the State, and the distribution and disposal within the State, of all vines, vine cuttings, debris of vineyards, empty fruit boxes, or other material on or by which the contagion of vine diseases and germs of vine pests may be introduced into the State, or transported from place to place within the State; to declare and enforce regulations approved by the Board for the disinfection of vines, vine cuttings, vineyard debris, empty fruit boxes, and other sus-

pected material dangerous to vineyards, while in transit, or about to be distributed, or transported into, or within the State; to classify the vineyards and viticultural regions of the State, according to the degree of health, or vine disease prevailing therein, and to change the same as circumstances may require to be done, subjecting each class to such varying rules and regulations, respecting the introduction or transportation of vines, vine cuttings, and other material liable to spread contagion of disease among vines, as may, in the opinion of the Board, become necessary and expedient for the preservation of vineyards. Such rules and regulations shall be circulated in printed form by the Board among the vine growers and fruit dealers of the State, shall be published at least thirty days in two daily newspapers of general circulation in the State, not of the same city or county, and shall be posted in a conspicuous place at the county seat of each county affected by their provisions.

SEC. 4. The Viticultural Health Officer may appoint local resident Inspectors in any and all of the viticultural regions of the State, whose duties shall be to report to him concerning the health of grapevines, the progress of vine diseases and pests, and all violations of the rules and regulations of the Board; to certify to the proper disinfection of vines, vine cuttings, empty fruit boxes, and other transportable articles required by the Board to be disinfected before transportation, or while in transit, or after delivery at any point of destination, the methods of disinfection to be determined and approved by the Health Officer and the Board; to seize upon and destroy all vines, vine cuttings, debris of vineyards, empty fruit boxes, and other material liable to spread contagion, which may be found in transit, or delivered after transportation, not certified to as required by the Board; *provided*, that the same may be exempt from such destruction if the cost of disinfection by such Inspector shall be provided for by the owner or agent in charge thereof, as may be prescribed for such cases of negligence, carelessness, or violation of quarantine rules, and to keep a record of all proceedings as such Inspectors; *provided*, that there shall be no compensation for such services of inspection, excepting a fee, not to exceed one dollar for each certificate of disinfection, in case of compliance with quarantine regulations, and not to exceed five dollars for each certificate of disinfection after seizure for non-compliance; *provided, however*, such inspection may be employed at the option of the owners of property requiring disinfection to disinfect the same. All vines, or other articles absolutely prohibited of importation or transportation, may be promptly destroyed by any Inspector discovering the same transported or in transit, in violation of regulations, and the cost of such seizure, together with a fee of ten dollars, shall be paid to such Inspector out of any fine that may be collected from the party or parties guilty of such violation. Willful violation of the quarantine regulations of the Board shall be considered a misdemeanor, and punishable by a fine of not less than twenty-five nor more than one hundred dollars. Whenever required for the convenience of vine or fruit growers, or fruit dealers, a resident Inspector shall be appointed upon petition of any three neighboring vine or fruit growers, or dealers in grapes, to reside in their vicinity, if not already provided for; and there shall be not less than two Inspectors appointed for each county which is subjected to such quarantine regulations, and they shall each be subject to removal at the will of the Viticultural Health Officer, if incompetent, or they fail to perform their duties, or are unreasonably distasteful to vine growers and grape dealers.

SEC. 5. It shall be also the duty of the Chief Executive Viticultural Officer to personally visit, examine, and report upon the several viticultural regions of the State; to prepare documents for publication, as required by the Board, relating to any and all branches of viticultural industry, including treatises for the instruction of the public; to supervise the preparation of reports for publication, and especially report upon the practicability and means of eradicating diseases from vineyards, and to superintend experiments with known and new remedies.

SEC. 6. All printing heretofore ordered by the Board shall be paid for out of the appropriations heretofore made for its use. All printing required hereafter shall be done by the State Printer.

SEC. 7. The salary of the Chief Executive Viticultural Officer shall be fixed by the Board, not to exceed one hundred and fifty dollars per month, for services while engaged as such officer, and his actual traveling expenses shall be allowed, not to exceed five hundred dollars per annum.

SEC. 8. The Board of State Viticultural Commissioners shall also appoint an officer, who shall be especially qualified by practical experience in horticulture for the duties of his office, to perform similar duties respecting the protection of fruit and fruit trees as are provided for in this Act in reference to grapevines, with like powers; and the salary and traveling expenses of such officer shall be fixed by the said Board at the same amounts provided for in the case of the Chief Executive Viticultural Officer; and the said Board shall have power to establish such quarantine rules and regulations as are required for the protection of fruit and fruit trees from the spread of insect pests.

SEC. 9. There is hereby appropriated for the uses of the Board of State Viticultural Commissioners, as set forth in this Act, and in the Act providing for its organization, out of any moneys in the State treasury not otherwise appropriated, the sum of ten thousand dollars for the year commencing July first, eighteen hundred and eighty-one, and ten thousand dollars for the year commencing July first, eighteen hundred and eighty-two; and the State Controller will draw his warrants upon the State Treasurer in favor of the Treasurer of the said Board for the said sums, or any part thereof, when they become available, upon proper demand being made for the same by said Board; *provided*, that no claim shall be paid out of said appropriation until the same shall have been presented to and approved by the State Board of Examiners.

SEC. 10. This Act shall take effect and be in force from and after its passage.

## CHAPTER LXXV.

*An Act to protect and promote the horticultural interests of the State.*

*The People of the State of California, represented in Senate and Assembly, do enact as follows:*

SECTION 1. Whenever a petition is presented to the Board of Supervisors of any county, and signed by five or more persons who are resident freeholders and possessors of an orchard, or both, stating that certain or all orchards, or nurseries, or trees of any variety, are infected with scale bug, codling moth, or other insects that are destructive to trees, and praying that a commission be appointed by them, whose duty it shall be to supervise their destruction, as hereinafter provided, the Board of Supervisors shall, within twenty days thereafter, select three Commissioners for the county, to be known as a County Board of Horticultural Commissioners. The Board of Supervisors may fill any vacancy that may occur in said Commission by death, resignation, or otherwise, and appoint one Commissioner each year, one month or thereabouts previous to the expiration of the term of office of any member of said Commission. The said Commissioners shall serve for a period of three years from the date of their appointment, except the Commissioners first appointed, one of whom shall serve for one year, one of whom shall serve for two years, and one of whom shall serve for three years, from the date of appointment. The Commissioners first appointed shall themselves decide, by lot, or otherwise, who shall serve for one year, who two years, and who three years, and shall notify the Board of Supervisors of the result of their choice.

Sec. 2. It shall be the duty of the County Board of Horticultural Commissioners in each county, whenever they shall be informed by complaint of any person residing in such county, that an orchard, or nursery, or trees, or any fruit packing house, storeroom, saleroom, or any other place in their jurisdiction, is infested with scale bug, codling moth, red spider, or other noxious insects liable to spread contagion dangerous to the trees or fruit of complainant, or their eggs or larvæ, injurious to fruit or fruit trees, they shall cause an inspection to be made of the said premises, and if found infected they shall notify the owner or owners, or the person or persons in charge or possession of the said trees, or places, as aforesaid, that the same are infected with said insects, or any of them, or their eggs or larvæ, and shall require such person or persons to disinfect the same within a certain time to be specified. If, within such specified time, such disinfection has not been accomplished, the said person or persons shall be required to make application of such treatment for the purpose of destroying them as said Commissioners shall prescribe. Said notices may be served upon the person or persons owning or having charge or possession of such infested trees, or places, or articles as aforesaid, by any Commissioner, or by any person deputed by the said Commissioners for that purpose, or they may be served in the same manner as a summons in a civil action. If the owner or owners, or the person or persons in charge or possession of any orchard, or nursery, or trees, or places, or articles, infested with said insects, or any of them, or their larvæ or eggs, after having been notified as above to make application of treatment as directed, shall fail, neglect, or refuse so to do, he or they shall be deemed guilty of maintaining a public nuisance, and any such orchards, nurseries, trees, or places, or articles thus infested, shall be adjudged and the same is hereby declared a public nuisance, and may be proceeded against as such. If found guilty, the Court shall direct the aforesaid County Board of Horticultural Commissioners to abate the nuisance. The expenses thus incurred shall be a lien upon the real property of the defendant.

Sec. 3. Said County Board of Horticultural Commissioners shall have power to divide the county into districts, and to appoint a local Inspector for each of said districts. The duties of such local Inspectors shall be prescribed by said County Board.

Sec. 4. It shall be the duty of said County Board of Commissioners to keep a record of their official doings, and to make a report to the Board of State Viticultural Commissioners on or before the first day of November of each year, who shall incorporate the same in their annual reports.

Sec. 5. It shall be the duty of the Commissioners at large, appointed by the Board of State Viticultural Commissioners for such purpose, to recommend, consult, and act with the County Board of Commissioners in their respective counties as to the most efficacious treatment to be adopted for the extermination of the aforesaid insects, or larvæ, or eggs thereof, and to attend to such other duties as may be necessary to accomplish or carry out the full intent and meaning of this Act.

Sec. 6. Each County Commissioner and local Inspector may be paid five dollars for each day actually engaged in the performance of his duties under this Act, payable out of the county treasury of his county; *provided*, that no more shall be paid for such services than shall be determined by resolution of the Board of Supervisors of the county for services actually and necessarily rendered.

Sec. 7. Each of said Commissioners may select one or more persons, without pay, to assist him in the discharge of his duties, as he may deem necessary.

Sec. 8. If any County Board of Commissioners, after having received complaint in writing, as provided for in section two of this Act, shall fail to perform the duties of their office, as required by this Act, they may be removed from office by the Board of Supervisors, and the vacancy thus formed shall be filled in the same manner as provided for in this Act.

Sec. 9. Nothing in this Act shall be construed so as to affect vineyards or their products.

Sec. 10. This Act shall take effect immediately.

# REPORT OF MR. ARPAD HARASZTHY,

PRESIDENT OF THE BOARD.

SAN FRANCISCO, December 28, 1880.

*To His Excellency GEO. C. PERKINS, Governor of the State of California:*

SIR: As President of the State Board of Viticultural Commissioners, and in accordance with an Act of the last Legislature passed for the promotion of the viticultural industries of the State, approved April 17, 1880, I herewith submit for your Excellency's consideration the subjoined papers, being the result of the labors of the Board. These consist of the reports of the several Commissioners; the President's report; the Treasurer's report; the Secretary's report; the minutes of the Board's meetings; the reports of the various committees; three lectures given in three of the viticultural districts, comprising a lecture on the Phylloxera, a lecture on the Curing of Raisins in Spain, and a lecture on the Maintenance of our Vineyards; original papers on the manufacture and use of the bi-sulphide of carbon in checking the ravages of the phylloxera, and also several valuable translations from the French, accompanied with plates describing and illustrating the habits and ravages of the phylloxera, the most dangerous pest the grapevine has ever known; a gifted translation from the French upon the mode of applying the bi-sulphide of carbon, in ample detail; a translated treatise on pruning; and several other valuable papers, to all of which is added a colored map, showing the present parts of the State as known to be infested with the phylloxera, as discovered by the joint investigations of this Board and the State University. Special comments upon the labors of the individual Commissioners would seem unnecessary where the reports are submitted; such, however, is not the case, for no one can understand, without going over the work himself, item by item, how much time, labor, and patience each Commissioner has had to undergo to collect the material he has presented; and it has all been a labor of love, without reward, other than the possible appreciation, at some future day, of his fellow citizens.

Among one of the first efforts of the Board was the attempt to gather directly from the vine grower in the State, correct information concerning the extent of his vineyard, his mode of culture, the varieties of the grapes planted, the disposal of his crop, etc. Great pains were taken by the committee to get up a detailed, easy, and concise printed form for the purpose, which were then sent out by each of the Commissioners in their respective districts. The result was in each case the same, and is comprised in the following words of one of the Commissioners: "Either through a lack of interest therein, or a misapprehension of the aims and objects of the Commission, I have received but few responses." The Commissioners were therefore left to gather information as best they could, through personal interviews, and their power to accomplish their aim became very

much restrained. The estimates made, however, are more correct than any heretofore gathered. But this work should be absolutely correct and complete in detail. Every vine grower's name in the State should be known, as well as the extent of his vineyard in vines and in acres; the age of his vines; the varieties planted; their respective yield; the pests and diseases that the vines are subject to; the cultivation; the pruning and general care; and finally, the disposal of the product, either for market, raisins, wine, or brandy. The Commissioners have spared no pains to gather all these points, so far as their time permitted, but they are busy men, one and all, and cannot devote *all* their time even in the public interest. The only way these important facts could be gathered, would be to empower the Board to engage the services of an expert at a fixed salary, who, under their direction, would visit every viticultural district of the State, and make it his only duty to collect data, take observations, gather detailed statistics, and do such other work as the Board in its judgment might require to advance the vine growing interest of the State. The Commissioners are all willing to advise, to direct, and give a certain amount of their valuable time for the promotion of the public good, but cannot afford to give all the personal work required to make this object complete. And the above plan is the only one, in our opinion, by which enough valuable and reliable information can be gathered to disseminate among our Eastern citizens, and induce them to come and make their homes with us, to dot our plains and spot our hillsides with happy homes and thrifty villages.

One of the most important labors accomplished by the Board has been the discovery of the phylloxera in Napa, Solano, Yolo, El Dorado, and Placer, whereas, before the Board began its labors, this fatal pest to the vine was considered to have existed only in the County of Sonoma. The danger is imminent; it is only through State legislation and assistance that the continued spread of its ravages can be checked, and one of the future grandest resources of the State saved. The State legislation must be in the shape of quarantine laws, to prevent the transportation of vines that have not been disinfected, as well as to compel certain care in infected districts. For more ample details on this head, I refer your Excellency to the exhaustive report of Mr. Charles A. Wetmore.

One of the most perplexing difficulties a beginner encounters in planting out a vineyard is the selection of the proper vines—and the nomenclature in that respect in this State is sadly deficient, as it has ever been; almost in each district, often in the same township, the same vine is called by several contradictory names; hence the great difference in opinion of vine growers as to the respective qualities of various vines. To remedy this evil this State should have an experimental vineyard in an important vine-growing district, which vineyard should range in extent from thirty to fifty acres, where every variety of grapevine in the State should be planted in no less a number than one hundred vines, whose habits, growth, production, and liability to disease would be carefully noted, and from which wine, brandy, raisins, or fruit for market would be made, as the quality would prove itself best adapted for; where seeds would be gathered and cuttings made for proper distribution to the public, and in its interest; and thus, and only thus, could our nomenclature be satisfactorily settled, and the comparative merits of the various

varieties be definitely arrived at. This would be one of the greatest benefits that could be conferred upon the viticultural pursuit of the State. Then California would not have the shame of going to borrow her required knowledge from Missouri, Ohio, France, Spain, or Portugal, but would have knowledge of her own and to spare. Then we would not only know the vines that have been imported and acclimated with us, but would also know those that have grown beside our numerous watercourses, on plain and amidst the mountain gorges, for ages past. Then the costly, tedious, and unremunerative work of determining the qualities of the seedlings, cuttings, and grafts of our wild vines would not be thrust unjustly upon the self-devotion and sacrifice of such men as Monsieur Mattier and Chas. A. Wetmore, but the State would deserve the credit that it had earned. This is what should be done. But will it be done? Even now I have warnings of a plan to have this Board, which has accomplished so much, as the subjoined documents show, merged into a gigantic other Board, whose interests are not in common with the viticultural interest, and never can be so made; whose efforts would be ill placed, and whose action would remain without fruit. What could be done where there are so many varied interests? Even were there one far-seeing, hard working vine grower in this huge Board, what could he do, even with autocratic powers, in his department? Could he be understood and the expenditures he advocated allowed among the indifferent and uninformed other members around him? I doubt it very much. I beg your Excellency to carefully compare the work of this Board, and then tell me if that work would have been complete without that of all the Commissioners joined to it? There is no single paper of this report that could be considered complete of itself, nor could it be so in any combined general agricultural Board, where the interests are too varied, too numerous to result in any pointed, definite benefit. I trust, for the future welfare of the pursuit we represent, that your Excellency will not entertain the merging of this interest with any other. And it is with a certain degree of pride that I assert that this Board, in the last six months, has accomplished more good, collected more real genuine facts, and in these reports disseminated more sound, practical, valuable knowledge for the promotion of viticulture in California, than was done by all the agricultural societies of the State combined for the last twenty years; not that I desire to deny the beneficial effects of such societies in their own understandings, but they have never harmonized with or understood the requirements of the viticulture of California, and therefore have never done anything for it. In corroboration I will only refer your Excellency to their reports. Then compare the money they have had and the money we have had. And while on this subject, I will call your attention to the subjoined report of the Treasurer, given in exact detail, showing a sum expended of \$1,777 01, not including the printing and distribution of these documents, which will amount to about nine hundred dollars more. There will then be left in the hands of the Treasurer the sum of \$1,322 99, which has been appropriated as follows:

Salary of Secretary .....	\$600 00
Office rent .....	240 00
Lectures, Commissioner's transportation costs, printing, and incidentals .....	482 99

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\$1,322 99

I beg especially to call your attention to the fact that we have secured all our lectures without cost other than hall rent and transportation fare, and also to the very moderate expenditures we have incurred throughout. We, unfortunately, felt the need of stinting our expenses, our means being so very limited, and our field so extended. Owing to this, we are now without maps, books, or periodicals in our office, and when the Secretary, President, or any of the Commissioners, desire to make any references, they have to seek information in the libraries of private individuals, instead of having their authorities at hand, as they should have them. The printing, too, of these documents, has been reduced through necessity to one half the contemplated number, thus greatly reducing the possible good of their free distribution. While, as to the phylloxera, they have been compelled to limit their labors to ascertaining its presence in certain districts without being able to conduct but one experiment towards effecting its extermination, though very many were suggested to the various Commissioners. In view, therefore, of the great interest at stake, and the necessity of prosecuting their labors to greater advantage, the Board have concluded to ask for an appropriation of ten thousand dollars a year for the following two years, and which it proposes to expend in the following manner yearly:

Secretary's salary, twelve months.....	\$1,200 00
Practical expert's salary, twelve months .....	2,000 00
Expert's fare for traveling .....	200 00
Office rent, gas, and fuel, twelve months.....	550 00
Commissioners' traveling .....	200 00
Lectures and hall rent.....	450 00
Printing and mailing reports.....	1,800 00
Experiments against phylloxera and diseases of the vine.....	3,000 00
Books and maps for library.....	400 00
Incidentals.....	200 00
Total .....	\$10,000 00

And with this sum, with the power to engage a traveling expert, they expect to be able to do some effective work.

To note the necessity of using urgent measures against the phylloxera, I have only to cite the following item from Mr. Wetmore's report, which shows the importation of foreign wine into Bordeaux, for—

Twelve months in 1879.....	7,287,376 gallons.
Nine months in 1880.....	14,652,000 gallons.

The total importations into France this year will probably exceed one hundred million gallons; far in excess of total exportations.

And all of which is owing to the continued devastations of this pest, which in the past eight years has destroyed one and a half million acres of French vineyards.

The amount of wine received at San Francisco from the interior was:

In 1880 .....	3,759,743 gallons.
In 1879 .....	3,364,607 gallons.

The amount of brandy received was:

In 1880 .....	133,764 gallons.
In 1879 .....	93,506 gallons.

Showing a very notable increase in the reception both of wine and brandy.

The shipments out of the State for 1880 of wine were:

By sea .....	1,545,715 gallons.
By rail .....	941,638 gallons.
Total .....	2,487,353 gallons.

In 1879 the total export of wine was two million one hundred and fifty-five thousand nine hundred and forty-four gallons.

The shipments of brandy for 1880 were:

By sea .....	97,533 gallons.
By rail .....	91,565 gallons.
Total .....	189,098 gallons.

The total brandy shipments for 1880 showing an increase of twenty-five million two hundred and six gallons over the shipments of 1879.

In round numbers, the vintage of 1880 has been estimated to range between ten and twelve million gallons. To arrive at a valuation, we will adopt the following figures:

9,500,000 gallons dry wines, at 25 cents .....	\$2,375,000
700,000 gallons sweet wines, at 60 cents .....	420,000
450,000 gallons brandy (in bond), at \$1 15 .....	517,500
Total .....	\$3,312,500

To this should be added about \$100,000 for value of raisins, and from one hundred to one hundred and fifty thousand dollars worth of grapes, used for table use, preserving, etc., making the grand total value of the grape production of the State about \$3,500,000 in the producers' hands.

The plantation of new vineyards has taken a renewed life within the last two years, and, for the year 1880, the estimate has varied from eight to ten thousand acres for the State; this coming season, from all accounts, it may reach twenty thousand, for on every side we hear of plantations, and on the grandest scale.

From the interesting reports of Mr. Rose, of the Los Angeles, and Mr. Blanchard, of the El Dorado Viticultural Districts, we learn that good grape lands can be had for from ten to a hundred dollars per acre in the former, and from ten to thirty dollars per acre in the latter district.

One of the most encouraging features of all is, however, contained in Mr. De Turk's report, who represents the Sonoma District, and who reports that last year two thousand acres of new vineyards were planted, which shows full well the confidence of the people of Sonoma in the future of this pursuit, in spite of the presence of the dreaded phylloxera. Mr. George West, of the San Joaquin Viticultural District, in his very interesting report, containing tables of the rainfall from 1871 to 1880, and a meteorological report for 1878-79 and 1880, taken at Stockton, also states that land can be had in San Joaquin County at from twenty-five dollars to one hundred and twenty-five dollars per acre, the best price being that paid for land close to the City of Stockton; fifteen dollars to fifty dollars in Stanislaus County, and five dollars to fifty dollars in Fresno County; while he puts the



production, without irrigation, at from five to ten tons per acre. To this he adds that wine grapes sold this year from sixteen to thirty dollars per ton around Stockton. In Mr. Krug's report, who represents the Viticultural District of Napa, we note the most extraordinary increased production of wine within the past decade—the production being two hundred and ninety-seven thousand six hundred and seventy gallons in 1870, and having risen to two million four hundred and sixty thousand gallons in 1880. In Mr. Wetmore's report we find, besides many practical and sound theoretical suggestions, a great amount of valuable and pertinent correspondence. But with these, he has, in a few words, drawn our attention to one of the most astounding, if not the most important, viticultural discoveries made in this age. I allude to what is called the "Vine of Soudan," said to have been discovered by the French botanist, Lécart, in the neighborhood of Koudian, in Africa. This vine is said to be an annual, springing from a bulbous root, and to whose flowers there succeeds sweet and exquisite fruits, and Mr. Lécart vouches that he had gathered and eaten its fruit after ample verification of the above statements. It is my opinion that the State could hardly pay a sum that would be too large to secure a number of these vines. Especially in Southern California would this wonderful vine be more likely to yield its fruit and prove its true value.

In the report of Mr. Blowers, who represents the Viticultural District of Sacramento, we find one of the most valuable papers. It contains exactly the kind of practical knowledge that both small and great California raisin driers have needed most; in its clear, concise, practical instructions they will find the short cut to success. It is in making public such papers as these, and the lecture on Raisin Making in Spain, by Mr. West, that the true value of this Commission is shown. Here in a few pages are embodied, on the one hand, the experiments of eighteen years on the part of Mr. Blowers, and on the other hand, the carefully collected observations of Mr. West, in a land six thousand miles away, where raisins have been made a thousand years. From Mr. W. B. West's figures, it seems that in 1878 the United States imported and consumed \$2,681,692 worth of currants and raisins. This was the amount used for forty million people; what will it be when, in twenty-five years, we are eighty millions of people? As to our production this year, we may have produced a little over \$150,000 worth. There is field yet for an increase, and especially in view of the lamentable ravages created in the raisin districts of Spain, through decay of the vines and the phylloxera.

In accordance with the Act of the Legislature, one lecture is to be given in each of the seven viticultural districts of the State within the year, upon some practical subject. There have been three lectures given: one in the District of Sonoma, on the Phylloxera and the Vine Pests, by Dr. Behr; one in the Sacramento District, on Raisin Making in Spain, by W. B. West, Esq.; and one in the Napa District, on the Maintenance of our Vineyards, by Professor Eugene W. Hilgard. These lectures all contain so much of value to this interest, that they have been added to our reports. In the following six months other lectures will be given in the remainder of the districts. To these reports have also been added valuable contributions upon the History of the Phylloxera in Sonoma Valley, by Mr. H. Appleton; upon Carbon-Bisulphide, for the Phylloxera, by J. H. Wheeler, Esq.; the History of the Orleans Vineyard and its diseases,

by J. Krauth; a valuable translation from the French upon the use of the Bi-Sulphide of Carbon for the Treatment of Vines, by Miss Anna Louise Wetmore; a translation from the French of an excellent Treatise upon Vine Grafting, accompanied by numerous illustrated wood cuts; a valuable translation, describing minutely, the Life, Growth, Transformations, Habits, and Ravages of the Phylloxera, also containing numerous engravings; a map of California, delineating in colors the districts where the Board of Commissioners have discovered the presence of the phylloxera, and a number of other very valuable papers. But one of the most important of all the works of the Board has been the encouragement it has given to the establishment of a factory for the production of the bi-sulphide of carbon at Berkeley, and which material is practically to be furnished at near cost price, eight cents a pound, thereby rendering it possible to stamp out the phylloxera from among us, and save our vineyards and their productions. I cannot say too much in praise of this factory, which is likely to save millions of dollars to the citizens of this State.

The documents which your Excellency will find joined hereto, comprise, in resume, the labors of this Board of Viticultural Commissioners for the first six months of its organization. From these you will see that a vineyard can be planted and maintained till its first year of production for less than seventy-five dollars per acre; and that good land upon which to plant, can be purchased at from ten dollars per acre, upwards; and it will be further seen that the net yield in coin to the producer this year has not been less than fifty dollars, and that the greater number has reached one hundred dollars per acre. In view, therefore, of the great advantages of viticulture in rendering valuable our millions of acres of now barren hillsides; of rendering productive in grapes and raisins our exhausted grain fields, which now barely pay for the seeding; in view of the advantages this pursuit offers to people of limited means to secure homes and an unfailing sustenance; in view of the enormous wealth the future exportation of our viticultural productions would bring to our golden shores, and populating our State with healthy, frugal, thrifty citizens; in view of all this, I beg of your Excellency to use your great personal influence and powerful recommendation towards securing for the use of this Board the most liberal appropriation possible.

I have the honor to remain, very respectfully yours,

ARPAD HARASZTHY,  
President State Board Viticultural Commissioners.

## REPORT OF MR. CHARLES KRUG,

TREASURER.

ST. HELENA, NAPA COUNTY, CALIFORNIA, }  
December 31, 1880. }*To the Board of State Viticultural Commissioners:*

GENTLEMEN: I respectfully submit the following report, showing the receipts and disbursements of my office as Treasurer of your Board, from the time I entered upon the duties of my office until the date hereof:

*Receipts.*

From the State Treasurer (being the full amount appropriated for the use of the Board by the Act providing for its organization)----- \$4,000 00

*Disbursements.*

Date.	No. of Warrant.	FOR WHAT PURPOSE.	Amount.
1880.			
July 1-----	1	J. I. Bleasdale, Secretary, May 25 to June 30-----	\$122 96
July 14-----	2	N. H. Eaton, rent, July-----	40 00
July 20-----	3	Chas. A. Wetmore, for Davis Bros., waste paper box, etc.-----	6 00
July 26-----	4	H. S. Crocker & Co., books, printing matter, etc.-----	72 05
August 5-----	5	F. G. Edwards, carpets and door mats-----	90 90
August 18-----	7	A. Wasson, sign painter-----	17 10
August 18-----	8	J. G. Allen, shorthand reporter-----	41 50
August 27-----	9	I. de Turk, President Phylloxera Committee-----	150 00
August 27-----	10	C. A. Wetmore, ordered by Board for Executive Committee-----	50 00
August 30-----	11	N. H. Eaton, rent, August-----	40 00
September 6-----	13	N. H. Eaton, rent, September-----	40 00
September 6-----	14	N. P. Cole & Co., furniture-----	190 00
September 7-----	6	J. I. Bleasdale, Secretary, July-----	100 00
September 7-----	12	J. I. Bleasdale, Secretary, August-----	100 00
September 30-----	16	J. I. Bleasdale, Secretary, September-----	100 00
October 1-----	15	N. H. Eaton, rent, October-----	40 00
November 1-----	17	J. I. Bleasdale, Secretary, October-----	100 00
November 15-----	19	Woodward & Co. (Alta), printing-----	118 43
November 15-----	20	Gregory & Co.-----	16 00
December 1-----	21	J. I. Bleasdale, Secretary, November-----	100 00
December 9-----	18	N. H. Eaton, rent, November-----	40 00
December 9-----	22	N. H. Eaton, rent, December-----	40 00
December 16-----	23	I. de Turk, Phylloxera Committee, balance-----	62 07
December 30-----	27	J. I. Bleasdale, Secretary, December-----	100 00
		Total-----	\$1,777 01
		Balance unexpended-----	2,222 99
			\$4,000 00

CHARLES KRUG, Treasurer.

N. B.—The sworn statement of expenditures, as required by law, has been submitted to the Governor, corresponding with the foregoing reports.

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R E P O R T S

TO THE

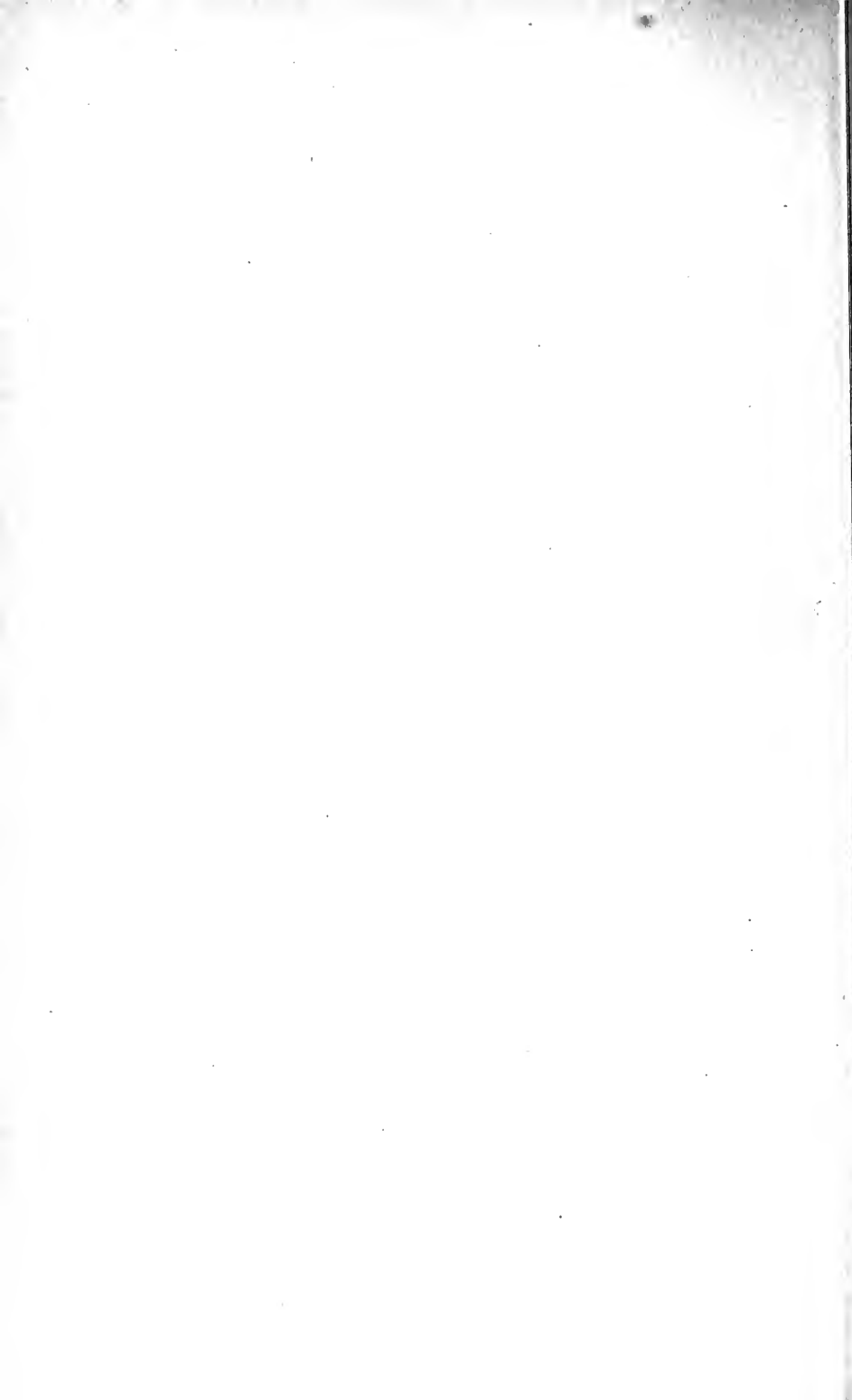
Board of State Viticultural Commissioners,

MADE BY THE

MEMBERS OF THE BOARD,

For the Year 1880.

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# REPORT OF MR. I. DETURK,

COMMISSIONER FOR SONOMA DISTRICT.

SONOMA VITICULTURAL DISTRICT, }  
SANTA ROSA, December 10, 1880. }

*To the Board of State Viticultural Commissioners :*

The undersigned, Viticultural Commissioner for Sonoma District, including the Counties of Sonoma, Marin, Lake, Mendocino, Humboldt, Del Norte, Trinity, and Siskiyou, herewith submits a report of the grape-growing interest of said district, and the official duties performed as such Commissioner from the date of the organization of the Commission.

I called a meeting of the grape growers of this district, which met in the Town of Sonoma on the 23d of July, which was well attended by grape growers from this and the Napa District, and by many others from the State at large. Important investigations were made in regard to the habit and extent of the phylloxera, and a number of instructive and interesting lectures were delivered. The transactions of this meeting will appear at length in the general report of the Commission.

On or about the first of August I addressed a circular letter to each of the Assessors in this district, requesting statistics of the grape interests in their respective counties. The replies received indicate that in the Counties of Marin, Mendocino, Humboldt, Siskiyou, Trinity, Del Norte, and Lake the grape is not cultivated to any extent worthy of mention at this time. I am, however, of the opinion that the soil and climate of Lake County are well adapted for grape culture, and that it offers an inviting field for grape growers.

In Sonoma County there is a large and rapidly increasing grape interest. I addressed circular letters to a great number of grape growers, with the request that they would furnish statistics upon which I might base an estimate of the grape interest and wine product of Sonoma County. I regret to state that I have received few or no replies to these inquiries. My estimate may not, therefore, be as accurate as desired, but it will closely approximate the actual product. The whole of Sonoma County, except a narrow strip on the immediate coast, is well adapted to grape culture. From the southern to the northern extremity of the county the grape flourishes, and good, sound, salable wine has been produced. A very interesting and successful experiment of Wm. Bihler, in lower Petaluma Valley, below Donahue Landing, has conclusively proven that the vine flourishes on the level with tide-water, as well as upon the red volcanic soil of the interior uplands. In view of Mr. Bihler's success, it may be justly claimed that the grape district of Sonoma County extends from

the shore of the bay at San Pablo to Cloverdale, and from the summit of the Mayacmas Range, the eastern boundary of the county, to within ten miles of the seacoast, a length of territory of sixty miles, and a breadth of twenty-five on the average. Within this area there is great variety of soil and marked climatic differences, producing wine uniformly good, but varying in essential qualities, and in the delicacy of its color and bouquet. There are in the county about 7,000 acres of bearing vines, and at least 3,000 not yet bearing, of which 2,000 acres have been set during the past year.

From the best information that can now be obtained, I estimate the wine product of this county for the year 1880, as follows:

Sonoma Valley .....	1,400,000 gallons.
Guillicos .....	150,000 gallons.
Bennett Valley .....	100,000 gallons.
Santa Rosa .....	200,000 gallons.
Windsor .....	75,000 gallons.
Knight's Valley .....	25,000 gallons.
Sebastopol .....	20,000 gallons.
Healdsburg .....	150,000 gallons.
Geyserville .....	40,000 gallons.
Cloverdale .....	30,000 gallons.
Total .....	2,180,000 gallons.

While there has been much damage by the phylloxera in some vineyards in Sonoma Valley, it is gratifying to note that there is an unusual product of wine for the year, and I am convinced that to this date it has proved fatal only on the shallowest soil in that locality. A careful examination has satisfied me that the insect has not appeared anywhere in this county outside of Sonoma Valley proper, and there the extent of the injury, as proven by this year's product, is much less than heretofore supposed.

Any attempt to give the varieties of grapes grown in this county, in the confused condition of grape nomenclature, would be useless. The old vineyards are mostly of the Mission variety, while those more recently set out are in the main the Zinfandel, Rieslings, Golden Chasselas, Traminer, Burger, Flame Tokay, and other popular foreign varieties. It may not be out of place to say that the subject of grape nomenclature is important and worthy of the attention of this Commission. If the varieties of grapes grown in this State were classified and named, it would be of great advantage to grape growers.

I received, in June last, a request from the Secretary of the Commission to procure official maps of each county in my district, with which I am unable to comply, for the reason that no official map exists in any of these counties.

Respectfully submitted.

I. DETURK,  
Commissioner for Sonoma District.

# REPORT OF MR. ARPAD HARASZTHY,

COMMISSIONER FOR THE SAN FRANCISCO DISTRICT.

SAN FRANCISCO VITICULTURAL DISTRICT, }  
SAN FRANCISCO, December 13, 1880. }

*To the Commissioners of the State Board of Viticulture :*

GENTLEMEN: Having the honor to represent the Viticultural District of San Francisco, I submit for your consideration the following report:

This viticultural district comprises the Counties of San Francisco, San Mateo, Alameda, Santa Clara, Santa Cruz, San Benito, and Monterey.

The number of vines planted in each county, as near as could be ascertained from reliable local sources, are as follows:

San Francisco.....	none reported.
San Mateo.....	225 acres.
Alameda.....	540 acres.
Santa Clara.....	1,451 acres.
Santa Cruz.....	430 acres.
San Benito.....	315 acres.
Monterey (estimated).....	100 acres.
Total.....	3,061 acres.

The greater part, say nine tenths of the above, are in full bearing. In this whole district the imported grapevines are in the greatest number, the Mission grape being less than half, and possibly not over one quarter of all planted. It is too early in the season to ascertain definitely how much wine was made in each county, but the following figures, I think, will be very close to the actual production, making due allowance for grapes shipped for market purposes in and out of the counties named:

San Francisco.....	250,000 gallons.
San Mateo.....	90,000 gallons.
Alameda.....	270,000 gallons.
Santa Clara.....	580,000 gallons.
Santa Cruz.....	172,000 gallons.
San Benito.....	60,000 gallons.
Monterey.....	none reported.
Total.....	1,422,000 gallons.

In the above estimate I have credited San Francisco with the manufacture of a quarter of a million gallons of wine, which, though a very large figure, I deem rather under than over the real amount made. There were enormous quantities of grapes sold this year to the smaller wine makers of this city, who are mostly composed of French, Portuguese, and Italians. These people, having a general



knowledge of wine making, as carried on in their own country, and looking upon wine as a necessity, each year manufacture enough, from grapes bought in the market, to supply their families, and often those of their friends, for the whole year. Their entire manufacturing apparatus would not cost a hundred dollars, and often not one half of that amount. It usually consists of half a dozen or more of French claret casks, a couple of tubs to tread out the juice from the grape, a small lever press, or, possibly, a small cider press, if the wine maker is ambitious and desires to be up to the times. And among this class of people all the members of the family drink wine—the father, mother, the boys, the girls, and down to the newly weaned babe. Yet, strange to say, you never see any of these people reeling in the streets in drunkenness, lying in the gutters, or conducted to the station house by a policeman. They have learned how to use wine from their very babyhood, and love it too well to abuse it. In the above estimated production of wine, San Mateo County was credited with ninety thousand gallons, which were partly made in Alameda County, the grapes having been sent there for that purpose.

There were less grapes sent to the San Francisco market from this district this year than in any previous year proportionally to the amount raised; the reason being that there was a general good demand for grapes at high prices for wine making in the near neighborhood of the vineyards.

The vintage has proved an excellent one, though at first there were serious doubts as to the sufficient maturity of the grapes, the season having been a late one, and continuing cold; finally, however, a warm spell set in at the most propitious moment, and soon dispelled all fears as to the non-maturity of the grape. The fermentation has been excellent throughout, and the color of the clarets, owing to the predominance of the imported varieties of grapes, has turned out generally very fine in this district. The quality of the wines that have come under my observation, is all that could be desired at this period of their manufacture. The varieties preferred here for wine making, are grapes belonging to the Burgundy species, such as the Pineau, the Charbono, the Grenache, Miller's Burgundy, etc.; and if we are to judge from the quality of red wines produced from them, these grapes are possibly the best that could be planted in the Counties of Santa Clara and Santa Cruz, where the peculiar soil brings out their characteristics in quite a remarkable degree. Beyond this, these grapes all maturing early, being excellent bearers, and giving a deep color to the claret they are made into, when properly handled, are just suited to the climate of these counties, which is cold, and where therefore the vintage would necessarily be late. At this date Santa Clara and Santa Cruz Counties can show wines which have no superiors in California, and it is my opinion that in the near future this district will not only produce very large quantities of wine, but that it will produce some of the very finest wines that will be made in the State.

A number of vineyards in the district are severely suffering from a form of fungoid disease which checks the growth of the vine, causing it to languish and become unproductive. I have been kindly offered a lecture upon this and kindred diseases by Mr. Justin P. Moore, and when the proper arrangements can be made for its delivery, it will be announced through the newspapers, with the day upon which

it is to take place, and I trust that as many wine growers as possible will be present. The lecture will relate to the growth and appearance of fungus upon the vine, its effect, and the best known remedies against it.

The prices paid this last season for grapes in the district, have varied somewhat; those nearer the wine makers and their presses realizing the better price. But the average price was high throughout, varying from eighteen to twenty-five dollars per ton, and no great distinction being made in variety. There are only a few large wine making establishments in the district, the smaller ones being the rule. From all sources I hear of renewed confidence in this pursuit, which has not only proved quite satisfactory during the last two seasons, but also quite prosperous. There were a great many vines set out last year, though how many I could not gather, and this year the plantations will be even more considerable, there being a great general interest shown in the undertaking among all classes of people, and especially farmers.

The amounts of wine and brandy received into this district, and reshipped during the past year, will appear in my report as President of this Board.

All of which I respectfully submit.

ARPAD HARASZTHY,

Commissioner of the Viticultural District of San Francisco.

# REPORT OF MR. GEORGE WEST,

COMMISSIONER FOR THE SAN JOAQUIN DISTRICT.

SAN JOAQUIN VITICULTURAL DISTRICT,  
STOCKTON, December 15, 1880. }

*To the Board of State Viticultural Commissioners:*

It is with regret that I am compelled to submit such a meager report from the various counties comprising the San Joaquin District.

I sent circulars to nearly all the viticulturists of the district, but, either through a lack of interest therein, or a misapprehension of the aims and objects of this Commission, I have received but few responses. The territory embraced within the district is so extensive it was impossible, in person, to visit each locality, and the time that has elapsed since the close of the season has been so very brief as to render it difficult to obtain accurate statistics, even had all grape growers heartily coöperated therein. I will, however, take up the several counties and submit such information in regard to each as I have been able to collect under very disadvantageous circumstances; premising that what has been said of San Joaquin County in particular, is applicable to the district generally.

Reports from Ezra Fiske, Joseph Putnam, Stephen Sanguinetti, T. S. Woods, A. T. Ayers, C. Von Detten, P. Fitzgerald, W. B. West, Geo. S. Ladd, Dodge & West, and W. L. Overheizer, are herewith submitted:

## SAN JOAQUIN COUNTY.

The land of this county is generally level, although the lower foothills of the Sierra Nevada impinge upon its eastern border. It is estimated to contain nine hundred thousand acres, fully one half of it suitable for the growth of the grape. The price of the best vine land varies from twenty-five dollars to one hundred and twenty-five dollars per acre, the highest price being for land in the immediate vicinity of the City of Stockton. The general character of the soil is clay and sandy loams, underlaid with marl, the water coming within ten to twenty feet of the surface. Our lands are more productive and freer from vine pests than those of France, Spain, Portugal, and Italy, formerly the favorite homes of the grape.

Most of the land can be irrigated or submerged either from natural or artificial sources. The San Joaquin, Tuolumne, Stanislaus, Calaveras, and Mokelumne Rivers, and their numerous tributaries, furnish unequalled natural supplies, while artesian wells have been successfully sunk to the depth of nine hundred and one thousand feet, at a cost of only two dollars per foot, affording an abundant supply of water for irrigating large areas of land.

So far, few viticulturists have deemed it necessary to resort to irrigation during the Summer months, but a few have submerged their vineyards in the Winter, thereby largely increasing their production.

The climate of this county, as shown by the following reports, seems particularly adapted to the growth and health of the vine. The northwest wind during the Summer prevents mildew and sunburn. We seldom have late frosts, and never have had one which materially injured the crop. I have never seen a variety that would not ripen, and most varieties are fully matured by the middle of September or first of October, which gives ample time for wine making.

The meteorological reports are kept at the Central Pacific Railroad depot, which is a one story wooden building. The observations were taken at two P. M. daily.

#### METEOROLOGICAL REPORT,

*For the seasons 1878, 1879, and 1880, as kept at the office of the Central Pacific Railroad at Stockton, California.*

##### TEMPERATURE—FAHRENHEIT.

	1878.			1879.			1880.		
	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.
January -----				59°	40°	49°	61°	42°	52°
February -----				68	50	62 $\frac{2}{10}$	59	46	53 $\frac{2}{10}$
March -----				84	54	63 $\frac{1}{10}$	68	51	57 $\frac{7}{10}$
April -----				70	56	64 $\frac{3}{10}$	73	52	60
May -----				84	61	67	86	58	68 $\frac{7}{10}$
June -----				95	70	84 $\frac{4}{10}$	85	70	76 $\frac{8}{10}$
July -----	93°	65°	86 $\frac{7}{10}$ °	100	78	86 $\frac{4}{10}$	95	77	83 $\frac{1}{10}$
August -----	99	65	80	103	79	88 $\frac{3}{10}$	85	70	78 $\frac{3}{10}$
September -----	92	73	82 $\frac{8}{10}$	98	71	83 $\frac{1}{10}$	90	72	80
October -----	88	51	73 $\frac{6}{10}$	88	63	72 $\frac{9}{10}$	79	66	73 $\frac{1}{10}$
November -----	69	54	62 $\frac{7}{10}$	66	50	58 $\frac{2}{10}$	71	47	61 $\frac{1}{10}$
December -----	68	52	58 $\frac{9}{10}$	61	46	51 $\frac{7}{10}$	68	54	59 $\frac{1}{10}$

##### RAINFALL,

*For the seasons 1871 to 1880, as kept at the State Insane Asylum, Stockton, California.*

	1871-2	1872-3	1873-4	1874-5	1875-6	1876-7	1877-8	1878-9	1879-80
Inches.	20.80	13.27	14.06	11.14	18.26	6.99	18.76	11.46	15.43

##### PRODUCTION.

Although the first planting of the vine in San Joaquin dates back to 1850, there are only about five hundred and fifty acres now in full bearing, all the energies of our farmers having been devoted to wheat culture, which brought the most immediate returns for the time and labor expended. To Captain C. M. Weber must be awarded the honor of planting the first grapevines in this city or county, but

many others soon after followed his laudable example. Vines in full bearing produce from five to ten tons per acre, and about one fourth of this product is shipped to San Francisco for table use, where those grapes always command the highest market price.

Wine grapes sold this year for from sixteen and one half to thirty dollars per ton, and have paid the producer from fifty to one hundred and fifty dollars per acre, the cost of producing the same not exceeding ten dollars per acre for cultivation, and one dollar to one dollar and fifty cents per ton for gathering. The demand for wine and brandy has increased, and the price advanced during the past year. I think no other production of our soil is so certain to afford remunerative returns, for, during an experience of twenty-five years, I have never known a failure of the grape as a paying crop.

#### WINES AND BRANDIES.

The prejudice that has heretofore existed against California wines arose, in a great measure, from the fact that most of the early vignerons planted the Mission grape, from which they made heavy white and red wines, which they put on the market when young and unfit for use. We find, by experience, that the Mission grape develops a marked sherry flavor after the fourth and fifth years, and it is better suited for port, sherry, and brandy, and that the lighter wines must be made from the Zinfandel, Riesling, White Nice, Bergur, Frontignan, and similar grapes, which wines contain less spirit. The quality of the wines and brandies made in this county is steadily improving each year, as the manufacturers become more familiar with the various processes and with the best methods of treating the different kinds of wine.

The varieties preferred for raisins are the Seedless Sultana, Mucsat, and Gordo Blanco, which make fine, high-flavored raisins and produce large crops. For table use the Black Prince, Flame Tokay, Muscat of Alexandria, Black Ferrar, and Emperor are planted, the first named being considered the most profitable, and is largely planted in this county.

#### DISEASES.

*Red Leaf*—So long known in France, where it is considered comparatively harmless, has been noticed in our vineyards for many years, but it has done little damage until this season. A liberal use of sulphur in June will check the disease, although the French wine growers report lime as the best remedy.

*Mildew (Oidium Tuckeri)*—This disease, well known to all vine growers, is easily prevented by the use of sulphur in quantities of forty to fifty pounds per acre.

*Black Knot*—This disease has been known in our vineyards for fifteen years, and has done but little damage. I believe it is caused by short pruning or late frosts. It seems to affect the Black Prince more than any other variety.

*The Thrip or Vine Hopper* is the most troublesome of all the pests that infest the vineyards of this district, and it has been a well known parasite since our vines were first planted. Six years ago they were very numerous. The past season they again appeared and did considerable damage. I have tried sprinkling the vines with powdered sulphur and lime, and used buhach (*pyrethrum cinerariæ*

*folium*) both in powder and solution, but found the latter too expensive. Have built fires in the vineyard at night, and although many of the full-grown insects were killed, there were enough small ones and eggs to renew the stock. So far I have found nothing practical that would destroy them except pasturing sheep in the vineyard after gathering the crop. Sheep eat the leaves, and thus destroy the eggs. Raking up and burning the leaves and weeds, thus destroying their harboring places, in connection with early plowing and thorough cultivation, will keep the pest within bounds.

Another pest which I would warn vine growers against, is the convolvulus, or wild morning glory. To young vines it is especially dangerous, and great care should be taken to destroy it when it first appears, as, when it obtains a firm foothold in rich, sedimentary soils, it is almost impossible to eradicate it. The only effectual means of destroying it is by thorough and continuous cultivation.

#### STANISLAUS COUNTY.

Stanislaus, like San Joaquin, is nearly level or slightly rolling land, except upon its eastern border. It contains eight hundred thousand acres, a large portion of it good vineyard land. I have no means of determining the exact acreage in vines, but estimate it at three hundred acres. The grapes grown compare favorably with those of other localities, the largest vineyards being in and around Knight's Ferry. Good grape lands are worth fifteen dollars to fifty dollars per acre, according to location and easy access to market. Nearly all the vineyards are irrigated by means of ditches or canals. H. B. Pentland, of Knight's Ferry, reports twenty-five to thirty acres in vines, and large quantities of suitable land in that vicinity. All varieties do well when irrigated, and no diseases trouble their vines. Joseph Dominici and V. E. Bangs report the same in substance, except that they do not irrigate. Their reports are appended hereto.

I have received a full report from Mr. H. R. Shell, manager of the Red Mountain Vineyard. This vineyard contains seventy acres, two thirds of which are of Mission, the remainder of Muscat and Zinfandel, all producing large crops. Large quantities of land, with good facilities for irrigation, can be bought in his locality for from ten dollars to twenty dollars per acre. The grapes ripen early and are seldom injured by late frosts. He recommends pasturing sheep in the vineyard to keep down insects, especially the vine hopper.

#### FRESNO COUNTY.

This is one of the largest counties in the State, embracing an area of five million two hundred thousand acres, mostly a sandy loam, a large portion of it arable, and at least eight hundred acres in vines. The natural facilities for irrigation are numerous and excellent, and artesian wells bored to the depth of one hundred and fifty to three hundred feet, in many places, supplement the water supply. A great number of colonies dot the county with settlements devoted to fruit and grape culture, the Central Colony being especially devoted to raisin culture; all irrigate, and the industry promises great developments in the near future.

F. T. Eisen presents a very full and interesting report, from which we learn that he commenced planting in 1873, and now has one hun-

dred and seventy acres in bearing, mostly wine grapes, comprising the Zinfandel, Riesling, Hamburg, Malvoisie, Muscat, and Fiher Zagos varieties. T. C. White, of the Central Colony, has a vineyard of thirty acres, all of the Muscatella Gordo Blanco, and devoted exclusively to raisins. W. B. Banister, Central Colony, has five acres in Muscatella. Miss M. F. Austin, manager of the Hedgerow Vineyard, Central Colony, cultivates thirty acres in Muscats, Gordo Blanco, and Seedless Sultana. For more detailed statements, I refer to the reports herewith submitted. Thousands of acres can be obtained in that vicinity at five dollars to fifty dollars per acre.

#### MERCED COUNTY.

In topography, soil, and climate, Merced greatly resembles the counties above named. The area embraces one million acres, nearly all susceptible of cultivation, and much of it adapted to the growth of the grape. The estimated number of acres devoted to its culture is about two hundred. No returns having been received, I am unable to report upon the present condition of this industry in Merced, Tulare, and Kern Counties, but hope to remedy this defect in the next annual report.

In conclusion, I would earnestly recommend the appointment of a State Entomologist, and the establishment of a Botanical Garden in connection with the Agricultural College of the State University. The Entomologist would be able to render invaluable services to fruit, vegetable, wheat, and vine growers, because new insects, diseases, and fungi, injurious to vegetation, are being constantly discovered and remedies sought for those already known. In the Botanical Garden, trees, plants, and vines of every variety could be collected, experimented with, and propagated for distribution throughout the State.

Respectfully,

GEORGE WEST,

Commissioner for the San Joaquin Viticultural District.

## REPORT OF MR. G. G. BLANCHARD,

COMMISSIONER FOR THE EL DORADO DISTRICT.

EL DORADO VITICULTURAL DISTRICT, }  
 PLACERVILLE, December 18, 1880. }

*To the Board of State Viticultural Commissioners:*

In submitting my report as Commissioner of the El Dorado Viticultural District, as an apology for its meagerness, I call attention to the fact that my district comprises fifteen counties, the most inaccessible in the State; with Modoc and Lassen on the north, Mariposa on the south, and Mono on the east, comprising almost the entire Sierra Nevada range of the State.

The soils of this district are nearly the same—what may be classed as second and third rate in excellence. The eastern portion of all the counties in my district, embracing more than one half of the area, is unfitted for the vine from climatic disabilities; but the western portion of all these counties, or what is commonly known as the “foothills,” is particularly adapted to the vine. It varies from a gray sandy, a volcanic brick color, to a brown slaty, the shallowest being two and one half to three feet, the deepest eight to ten feet in depth.

In El Dorado County there are between eleven and twelve hundred acres now in bearing vines. The average number to the acre is eight hundred. These produce on an average of two tons to the acre of grapes. The proportions and kinds growing—taking one hundred as the sum—are as follows: Mission, or native grapes, sixty-eight; Catawba and Isabella, ten; White Muscat, Muscatella, Malaga, six; Tokay, Black Morocco, Malvoisies, one; Zinfandel, Riesling, two. The other thirteen are made up of numerous other varieties, such as Sweet Water, Black July, Hartford Prolific, Cloan-tha, and Concord, and some others.

Very few vines have been planted in El Dorado County for the past five years, not to exceed fifteen thousand in all. The Mission, or the wine grape, is the most prolific bearer. The number of gallons of wine produced will not fall short of three hundred and fifty thousand; the number of gallons of brandy produced is about one hundred and fifty thousand. There are from seventy-five to one hundred and fifty tons of grapes used for raisins. They are usually dried by sun, some few by artificial heat. Grapes for wine sold at a uniform rate of fifteen and one half dollars per ton, table grapes at from three to eight cents per pound. The vine throughout the district is healthy and shows not its age. I regret to state that the investigations of Mr. Morse prove that our vines upon shallow, clayey, adobe, and black soils are infested with phylloxera, but to no considerable extent—in fact the presence of this pest is barely noticeable.

In Nevada, Placer, Amador, Calaveras, Tuolumne, and Mariposa Counties, the country conditions of soil and climate are about the same as El Dorado, yet these counties have not given the attention to the growth of the vine that El Dorado has. In Nevada County I am able only to approximate the actual state of things. The number



of acres of vines, taking small with larger growers, is about four hundred. In Placer there are about eight hundred and fifty to nine hundred acres; in Amador County, about six hundred acres; in Calaveras, about four hundred acres; in Tuolumne, about four hundred acres; Mariposa about five hundred acres, as near as I can learn.

The varieties of vines raised in these counties are about the same as in El Dorado, as well as the average yield, and the amount of wine and brandy made is about in the same proportion to the number of acres planted as in El Dorado. The phylloxera has also made its appearance in the vineyards of Placer, Nevada, Amador, and Calaveras. In Yuba, Sierra, and Plumas I have no report, but am credibly informed that in each of these counties there are many of the healthiest vineyards in the State, though small in comparison. Inyo, Modoc, Mono, Alpine, and Lassen have not given much attention to this industry, although the soil and climate of many portions of all of these latter counties are susceptible and fitted to vine growing. There are in my district hundreds of thousands of acres of the very best vine-growing land in the State that can be had for the taking. Improved lands, in bodies of from one hundred to three hundred acres, where from three fourths to four fifths of the whole are suitable for vineyards, can be purchased at from ten dollars to thirty dollars per acre, in many cases with a vineyard of from five to ten acres already planted. The physical qualities of the soils exerted upon by the atmosphere above, subterranean water currents below, taken with the physical properties of the soils and its rich chemical constitution, from experiments already made, make the "foothills" comprising my district, with the cheapness of the lands, the most desirable and advantageous outlook for California's future vineyards. The foothill grape is said to have a superabundance of sugar for a superior quality of wine, but this is shown to somewhat decrease with cultivation. Since California wines have taken a front place in the markets of the world, our grapes have commanded a better price and a readier sale, and very many hundreds of acres are now being planted. In this report it will be impossible for me to give the names of each vine grower and his vine acreage, but I hope to be able to do so in a future report. It is desirable in the future, in planting vines in my district, to avoid shallow clay and bed-rock soils, to seek the sandy, porous, and easily pulverized ground, with the vine fair to sun during the whole day.

Upon the first appearance of disease, as colored leaves, leaf-dropping, stunted growth, and dropping fruit, the vines should be eradicated from the soil, and the place supplied with a hardy plant. If phylloxera has appeared, the work of extermination should commence at once. While analyses of crops made in Europe are uncertain guides, and even those of the Eastern States, or California, yet the experience of the French in vine culture, and cause of decay and remedy for vine disease, may be seized upon, and applied to advantage here. The influences of season and climate in developing viticultural principles must be, of course, studied and applied here. Size of fruit, flavor, hardness, thriftiness of growth, healthfulness, productiveness, and capability of resisting insect pests, should mark the kind of vine to be welcomed as worthy of general cultivation. That such a vine can, by experiment, be discovered, is highly probable.

GEO. G. BLANCHARD,  
Commissioner for the El Dorado Viticultural District.

# REPORT OF MR. R. B. BLOWERS,

COMMISSIONER FOR THE SACRAMENTO DISTRICT.

SACRAMENTO VITICULTURAL DISTRICT, }  
WOODLAND, December 11, 1880. }

*To the Board of State Viticultural Commissioners:*

Raisin making being one of the important interests in this viticultural district, I will explain the California method, the Spanish method having been ably described in the lecture of W. B. West, delivered during the last State Fair, being the annual lecture for the Sacramento Viticultural District, which will be found attached to this report. Raisins are made from the Muscatella, Gordo Blanco, and Muscat of Alexandria, preferably of the former; also a seedless raisin, highly esteemed, made from the Seedless Sultana. The grape should be allowed to remain on the vine until quite ripe, showing a yellowish or golden color, and being more translucent than when too green. Then they should be carefully picked and placed upon a drying tray (usually two by three feet in size), then exposed with an inclination toward the sun, in some convenient place, generally between the rows in the vineyard, or in some contiguous open land. After having been exposed a sufficient time to become about half dried, they are turned once in this manner, viz.: two workmen taking an empty tray, place it upon a full one, holding them together firmly, and with a swinging motion turn them over, and replace the now turned grapes in their former position. The turning should be done before the dew is quite off the grapes in early morning; then, when the grapes have become so dry as to lose their ashy appearance, some being a little too green and some quite dry enough, they are, after removing those entirely too green, slid from the tray into large sweat boxes, having a thick sheet of paper between about every twenty-five or thirty pounds of raisins, then are removed to the storeroom, where they should remain two weeks or more. When ready to pack, it will be found that the too moist ones have parted with their surplus moisture, which has been absorbed by the stems and drier raisins. The stems are now tough and the raisins soft and ready to pack. They are carefully placed in packing frames made of iron or steel. The large and fair ones being placed carefully in the bottom of the frames, the surplus stems and imperfect berries cut away, then the average raisins are arranged in and weighed, placing five pounds in each frame, then pressed enough to make them firm in the frame, but not enough to break the skin. They are then passed to an inspector, who examines the exposed side of the raisins, removing any imperfect ones, then placing the wrapper paper on the frame, holds it in place with a wooden or steel plate, turns it bottom up, drops the left end into the box, slides the plate quickly from under the frame, and it drops into the box, then pressing slightly upon the

movable bottom of the frame, the frame is removed; the bottom of the frame is then pressed more firmly, to cause the raisins to fill the space formerly occupied by the sides and ends of the frame; then it is removed, and the face of the latter is exposed, all imperfect berries or too wet ones are removed, and all vacancies or hollows filled by large, loose raisins. The label of the proprietor is then placed on the face; the ends of the wrapper, and then the sides are folded over, the box cover nailed on, and they are ready for market.

The complaint is sometimes made that the California raisins have too tough skins, too large and too many seeds, lose flavor in cooking, lose their bloom, and do not keep well. The most of these objections arise from an imperfect knowledge of the best varieties from which to make them. If Californians would confine themselves to varieties which centuries of experience have proved to be best in Europe, there would be more satisfaction in the result. Cultivation, irrigation, local climate, kind of soil, and exposure to sun, all have an influence in modifying the characteristics of any one variety. Virgin soil and vigor of vine may make the seeds fuller, as it does in all cereals, but it should not, other things being equal, make skins thicker, but the contrary.

Soil for raisins, a rich, sandy loam preferred; climate, warm; soil, moist; Winter irrigation in average years being quite as important as Summer in our dry valleys. For safety against many kinds of insect pests, the phylloxera especially, a location is desirable where water is plenty and evenness of land surface permits Winter submersion. In such favorable locations a larger berry, thinner skin, better yield, etc., will be the result. The vines are planted eight by eight feet in many locations, but growers of the greatest experience prefer a greater distance apart; some plant eight feet by ten feet, some ten by ten feet, thus giving greater vigor to each vine, enabling it to resist enemies of all kinds more surely.

Many hundred tons of shipping grapes are sent east from this district to all principal markets in the United States. The Emperor, Tokay, Black Morocco, and Muscat family are most liked for the Eastern market.

Irrigation is a very important factor in the success of the fruit grower, but if the situation is good in other respects, and no ditch water can be secured, it is found that in many parts of the State an unfailing supply lies but a small way beneath the surface in gravel ridges. Former watercourses having been filled with gravel, the surface stream diverted sometimes many miles away, leave quite a large flow of water in the gravel. This being tapped by a well, the only equipment needed is a straw-burner engine and rotary pump, and one hundred or more acres can be irrigated with economy, insuring a good profit and a pleasant home.

In an experiment made recently in Yolo County, after having submerged the entire vineyard for nearly two weeks, such a well being on the place, the ditch water was shut off from twenty acres of the vineyard, and while the water still covered the entire surface to the extent of over nineteen acres, the pump was run five hours, supplying the seepage and raising the water five eighths of an inch over the entire surface, showing that in twenty-four hours three inches in excess of the seepage could be added to nineteen acres after the ground had been saturated.

Cost of planting and cultivating, irrigating, labor, subsistence, etc.,

including total expense for first year, is from twenty to twenty-five dollars per acre, if thoroughly well done; second year, fifteen to twenty dollars; third year, many varieties, if well cared for, yield a profit; if not well attended to it may take a year or two longer. Nothing pays better than care, and nothing loses more surely than negligence in vine growing. In pruning, the habit of each variety grown should be closely studied. In grafting great care should be taken to choose stock with wood of similar growth; if the variety desired is a coarse wood and large grower, a similar stock should be selected; if wood is of fine texture and slow growth, a wood of fine texture should be selected as grafting stock. As fruit growing is destined to be the pursuit of a large portion of the agriculturists of this State, and their experience shows a yearly increase of insect pests, doing great damage to the various branches of the industry, a State entomologist, whose duty should be to study the habits of all injurious insects and assist in devising means for their extermination, seems to be an actual necessity; also, the enactment of some law compelling those careless of their own interests to keep their fruit farms from breeding insects for the contagion of surrounding districts.

R. B. BLOWERS,  
Commissioner for the Sacramento Viticultural District.

## RAISIN MAKING IN SPAIN.

ADDRESS DELIVERED BEFORE THE ANNUAL MEETING OF THE SACRAMENTO  
VITICULTURAL DISTRICT, AT SACRAMENTO, BY W. B. WEST, OF STOCKTON.

[Appendix to Report of Mr. R. B. Blowers.]

At the annual meeting of the Sacramento District, called by me to be held at Sacramento during the time of the State Fair, the following address was delivered by Mr. W. B. West, of Stockton, a gentleman of long experience in viticulture in this State, who has studied raisin making in Spain. Mr. West said:

LADIES AND GENTLEMEN: Only a few years ago it was impossible to find any California raisins that were worthy of the name. We were groping in the dark; we knew nothing of the varieties to plant, how to cure them, or how to pack them. We knew nothing of localities suited to the raisin grape, and we had extravagant notions of the profits of the business.

All this has passed. We begin to understand the requirements of the business, and there were produced in this State in the year of 1879, at least 75,000 boxes of good marketable raisins. We have also learned that to succeed we must have knowledge, patience, energy, and brains; that we must have the right kind of soil and climate for

the true raisin grape. The Muscatella will not succeed everywhere, even in California. Many who rushed into the making of raisins a few years ago, found that there was too much to learn, and gave it up after making a few tons of trash from all kinds of grapes, dried and packed in a slovenly manner. A few indomitable persons stuck to it; they had hard times; the price of foreign fruit was low; they had much to learn; but they persevered, and are now nobly rewarded. They have taught us that only in certain localities can the business be carried on profitably. We are gaining information by these experiments every day, so that the future of raisin culture is more certain.

The California process will be given in the report of the Commissioner of this district, R. B. Blowers, who is amply able to do it justice, as he is one of the most successful producers in the State. To those who possess the required skill and capital, the method of drying by artificial heat is of much value. But I believe in the future this business is destined to be carried on by small farmers. It is preëminently a matter of detail. It is such a business as will give employment to the family of the poor man—the one to make the little homestead in the hills a source of revenue. To these the Spanish method is well adapted. I propose, therefore, in this paper, to give their methods of cultivation and preparation for market. From a people who have cultivated the grape and made raisins for many generations, we can certainly learn something, especially as we are only beginners.

#### RAISIN MAKING IN SPAIN—PRICES AND CULTIVATION.

The raisin district of Malaga extends about seventy-five miles along the coast and six inland. In this little strip of territory are produced all the Muscatella raisins of Europe, amounting, at present, to over three million boxes per year. Not near all the land is devoted to raisins. Much of it is hilly, and too dry and barren to produce anything. Some of it, like the Vega of Malaga, is planted with sugar cane. Oranges, lemons, and bananas are grown on the terraced sides of the ravines, where irrigation can be commanded. The olive, fig, almond, caroba, and prickly pear occupy some portion of almost every plantation. Many places are still unoccupied, the people seeming to want the enterprise or money to develop them.

In order to fully understand the matter, let us honestly compare our products with those of Malaga and see if we have anything to learn.

Our newspaper writers sometimes tell us that our raisins are at any rate equal, if not superior, to those of Malaga. What are the facts? Our merchants (men of figures) tell us that our best brands are almost but not quite equal to London Layers.

The following was the relative price of fruit at Malaga in August of 1878. It is the first cost in store—that is, the price paid to the producer, who only furnishes the fruit, the boxes, and common paper, which has to be changed by the merchant.

There are five qualities better than London Layers, known as Nos. 1, 2, 3, 4, and 5. No. 1 rates at \$4 50 per box; No. 2 at \$3 75 per box; No. 3 at \$3 25 per box; No. 4 at \$2 50 per box; No. 5 at \$1 75 per box; London Layers, \$1 25 per box; Loose Muscatellas, \$1 10; Layers, \$1. The year 1878 was a year of unusual depression, the prices being at the lowest ebb.

The proportion of fruit better than London Layers, varies at different vineyards, so that I cannot give the estimate exactly, but in one instance, where the party was said to be skillful, and with honest packers, it was given as one fifth. Thus, you see, that one fifth of their fruit was better than any of ours, and that ours could be ranked as only sixth in quality there.

It is a fact that their fruit, as it is put on the market, is better than ours. The reason for this will be explained in due time. In the Spanish methods of planting and cultivation we have nothing to learn. The cost of labor in this country entirely shuts us out, if we were disposed to follow them. I will only state that all planting and cultivation are done by hand. For planting, large holes are dug, often three feet square and two or three feet deep. The whole vineyard is dug over twice a year with hoes, which cultivates it very thoroughly. The pruning, also, is very close, usually leaving only one eye. To this thorough cultivation and short pruning I attribute the high quality of their raisins. The average yield of their vineyards is quite small. At one place, where the raisins were very fine, the yield was only two pounds per vine. As there were one thousand vines per acre the yield was only one ton; still it was called a profitable and valuable place. The yield on some hillside vineyards is even less than this, while on some valley land the vines will yield from five to ten pounds each.

#### THE SPANISH METHOD OF CURING.

In their mode of curing we may find something of advantage to us. As our grapes ripen nearly a month later than theirs we have trouble to get them dried, and have resorted to many expensive methods to accomplish this purpose.

Now, the climate in which the Spaniard cures his raisins in fifteen days is not any warmer than ours. It is a little more moist and sometimes varied by showers; but his fruit being securely covered by boards remains perfectly safe, and by being covered at night to protect it from the dew, he is enabled to cure his raisins in the time stated, while we in California, who cure them on boards or canvas, are usually twice as long. I would, therefore, call your attention particularly to their drying floors, which will be described.

Their grapes commence to ripen by the first of August, and are usually gathered by the fifteenth of that month. They are not all picked at the same time, but only those that are perfectly ripe. Much judgment is required in this matter, as unless the grapes are perfectly ripe they will not make good raisins. They are picked from the vines very carefully, taking care to handle them by the stems, and are placed upon willow trays and carried to the drying floors. In every subsequent operation care is taken not to disturb the bloom, which is very important to the higher grades.

We will now describe the drying floors, which are constructed as follows: Where the country is a little hilly, as it usually is, advantage is taken of some slope with a southwestern aspect. When this is not obtainable, an artificial slope is sometimes made by building a strong wall for the back and sides and filling in with dirt. Sometimes they are perfectly level. They like to have them with such an inclination as will allow the water to run freely from the covers. The length of these floors, which depends upon the inclination of

the land, is usually about forty-five feet where the angle is about forty-five degrees; where it is steeper they can be longer. The width is fourteen feet. Between each bed is a path of three or more feet. Around the outside of these beds is a row of tile to prevent the water from entering from the paths. These are properly cemented, and it is very important that no water should enter. In the middle is a row of tile to support the center of the covering, which is of boards fourteen feet long by one foot wide. They are laid across the bed, and are lapped one over another, so that no rain can get in. The bottom, upon which the grapes are placed, is of the natural soil, and is always loose and dusty, the vineyardists contending that the dust rather protects than disturbs the bloom. The grapes are placed quite closely upon this floor, but not so as to cover each other. Every one who has grown grapes knows that there is one side of a bunch of grapes that shows the stem more than the other. This side should be placed upwards. The covers should not be placed on at night, until the grapes have shriveled a little, or in three or four days. At the end of eight days, if the weather is good, they will require to be looked over, to take out such grapes as have dried in advance of the others, and these are clipped out with a pair of scissors. If allowed to remain they would become hard and worthless. A man commences at one end of the bed and selects those that are dry, or nearly so, placing the remainder back just as they were before, not turning them over, as is the universal practice here. The reason for this is that the side cured on the ground presents a more attractive appearance than the other.

At the end of the next seven days, the raisins are fully cured. Here let me state that no substance has been found that will cure a raisin so well as the ground, and no plan have I ever seen that seemed to me to be more fitted to accomplish the object sought than the Spanish sidehill drying floors.

Those made upon level ground require a few days more to cure the fruit, and are sometimes covered with cloth or corrugated iron. The superiority of this method over the ordinary California way of using boards or canvas is so marked that I hope some of our vineyardists will give it a trial. The necessity of covering fruit at night is not properly recognized in this State. I have found fruit in Spain warm and dry in the morning, whereas it would require at least two hours sun to bring it to that state had it not been covered. The covers also protect them from any showers that might come up during the drying season. They are also useful in retarding the drying, as it sometimes occurs that the raisins cannot be packed as fast as they dry.

#### ASSORTING AND PACKING RAISINS.

The assorting and packing comes next. The raisins are taken directly to the packing-house, and assorted and packed immediately for market, not going through any sweating process, which some of our people think necessary.

This sorting is of such a complicated nature, and requires so much skill, that it would be utterly impossible for us to follow it. They calculate that it requires a day's labor to select and pack a box of the best raisins. Another good reason is that the American market demands but few of the higher grades of fruit. The London Layers and the loose Muscatellas are the most sought. As a full description

of their modes of packing would take much time to go into detail, and be of no practical advantage, I will pass them with a few remarks.

The fruit is, as I said before, taken immediately to the place for assorting. A skillful workman takes each bunch in succession and grades them according to their size and condition. When a bunch contains two or more grades, as they usually do, it is cut up so that each can be put in its proper place.

Each kind is carried to the workman who is packing that particular class. Although the raisins never hold out to the weight which they are supposed to represent, I noticed the workmen were careful to weigh each form as they were put into the box. They are packed in forms of six pounds each, using common paper, which is replaced in the warehouses by a more fancy article, at the option of the purchaser. The loose Muscatellas are those single berries which may be on a bunch of superior class, which their strict grading requires to be cut out; hence they are usually of a better size than their price would seem to warrant.

#### FAULTS OF CALIFORNIA RAISINS.

I will mention some of the faults of our raisins. I do not take into consideration any of those products made from all kinds of grapes, which are sometimes called raisins, but only those produced from the Muscatel.

*First*—They are not evenly dried, some of them being cured too much and others not enough. This can be obviated by going over them at the proper time, as mentioned before.

*Second*—They are too small. Not enough attention is paid to pruning closely. They are not properly thinned when there is an over-crop. The practice of allowing a vine to produce fifty or sixty pounds is pernicious. Where the size of the berry is small do not allow it to bear so much another year. The Spaniards take off much of their fruit. They even clip off a part of a bunch when they think it is too large. We had better have less berries than such small ones.

It is sometimes urged that we cannot afford to take the pains that the people of Europe do; that labor is too high. It is too high for many of their operations, but at the same time it never pays to do work poorly. There is time wasted upon every farm, which, if properly applied, would go far toward making up the difference between European labor and ours. Our land can be worked at less expense by using horses to plow instead of hand labor. Our crops can be gathered at small expense, because we can use the wagon in the place of the hand-basket; surely we ought to be able to give our vines the proper pruning and thinning they need. Nevertheless, when we look back and see what a marked improvement there has been in our raisin interest during the past four years, we do not feel like finding fault with our pioneer raisin growers. They, like all others who have been connected with the grape interest, have had much to contend with.

#### THE SEEDLESS OR CURRANT GRAPE.

There is another class of fruit that is destined to be very prominent in our products. I refer to the seedless varieties of grapes. At present they have not been largely planted, nor have they been, as a rule,



a success. I will describe the different varieties, and endeavor to show why they are not more successfully grown in this State..

The true currant of commerce, known as the Zante currant, is a black variety, very productive, but has never been grown successfully except on the Ionian Islands of Zante and Cephalonia and the southern coast of the Gulf of Corinth, from Patras to Corinth. On the northern side of this gulf it is a partial or generally a total failure, as it is also in other islands near. In this State it has never been tried with the same treatment that it receives in the Morea; that is, flooded in the Winter and pruned long, but it has usually been pruned like the Mission grape, and grown in vineyards with other varieties. We have, therefore, no right to say it cannot be grown profitably. The man who can grow the Zante currant successfully has a fortune. The white variety of currant is quite common here, but is too small and too poor a bearer to pay for cultivation. The Sultana is the most promising of all the seedless kinds. It is of good size, is productive, and finds a good market. It is bound to supersede the Muscatella in many branches of cookery. I find that the demand increases in a greater ratio than the supply, which is at present limited. It did not attract much attention until last year, and consequently has not been planted largely. When its good qualities are known it will be planted extensively.

#### PROSPECTS FOR A FUTURE MARKET.

As the question of our ability to make raisins successfully has been fully answered by the amount and character of those put on the market last year, we will now consider the chances for a market. I believe it is generally conceded that our products have quite shut out the foreign brands, except, perhaps, a few of the choicer grades. Our production more than equals the consumption; our vineyards are constantly increasing; the time has come when we have to seek other markets, where our fruit will come in direct competition with that of Malaga.

If we call our best raisins nearly equal to London Layers, our average would be about equal to Layers. The price of Malaga fruit has been very low since 1875, on account of the depression in business which naturally followed the close of the French and German war.

We quote, however, the price of Layers in the New York market: in 1875, two dollars and fifteen cents per box; in 1876, one dollar and ninety cents; in 1877, one dollar and sixty cents; in 1878, one dollar and eighty-five cents; in 1879, one dollar and sixty-five cents; in 1880, two dollars and twenty-five cents. It would be hardly right to estimate upon the average of these years, as some of them represent seasons of great depression. The vineyardists of Malaga complained greatly of the low price of their fruit, stating that the culture was not profitable; that a few years like 1877 and 1878 would bankrupt them. The phylloxera has commenced its ravages there, and as the vineyards are old and worn, most of them on the hillsides, we may soon expect to hear of a decrease of product and consequent rise of price. We may not be able to find a market in the Eastern and Middle States, as they are more exacting in quality, but in the Southern and Western States, and also in the Territories, our field is large.

I will not make any estimates upon the profits of the business.

There are possibilities in the future beyond my foresight. Those who have made raisins know better what the cost of production is. The present railroad charges is one and a half cents per pound. I see no reason why they cannot be sold in the Chicago market with a profit to the producer.

In order to show the magnitude of the raisin business, I will give some statistics from official sources:

EXPORTS OF RAISINS FROM MALAGA TO THE UNITED STATES.

	Boxes.	Barrels.	60-lb cs.	Value.
1869 -----	1,343,005	25,552	20,134	-----
1871 -----	1,227,323	650	26,175	\$2,829,486
1874 -----	1,197,533	586	32,086	2,202,637

ENTERED FOR CONSUMPTION.

	Pounds.	Value.
1876 -----	32,221,065	\$2,425,277
1877 -----	32,419,637	1,109,334
1878 -----	32,931,736	1,904,866

Duty, two and a half cents per pound.

CURRENTS.

	Pounds.	Value.
1876 -----	20,911,061	\$856,426
1877 -----	17,152,664	749,488
1878 -----	17,941,352	776,827

Duty, one cent per pound.

# REPORT OF MR. L. J. ROSE,

COMMISSIONER FOR THE LOS ANGELES DISTRICT.

LOS ANGELES VITICULTURAL DISTRICT,  
SAN GABRIEL, December 9, 1880. }

*To the Board of State Viticultural Commissioners :*

It is a pleasing task to review the grape and wine industries of Los Angeles County for 1880. Crops have never been larger or of a better quality, and the demand for the grape by wine makers has been good, and continued so to the end. All parties concerned are satisfied, and contentment and plenty cheer the vigneron on to renewed effort for the coming year, which already is full of pleasing prospects. They are casting an agreeable shadow before, through an abundant rain for the season thus far, and the viticulturist is now busy in pruning and saving cuttings for future planting. There will be more vines planted the coming season than ever before. There have already been eight hundred thousand cuttings engaged at my place, and the demand for certain varieties is in excess of the supply.

It is now a proven fact that we, too, can make the finer qualities of light bodied pure wines. In former years Los Angeles had the reputation of being especially adapted for the making of Port, Angelica, Sweet Muscat, and Brandy; but, in the making of light dry wines, the county stood last on the coast. The writer never shared in that belief; for, if the Mission grape attained a higher and more perfect maturity, and made a wine of the best quality for which it was adapted, I could not see why other varieties of grapes, which were suited for other kinds of wine, should not, also, when ripened in our genial, pleasant climate, make a wine—a light wine—characterized by a bouquet of the best quality. It is now an admitted fact that no country, no difference how well adapted for the growing of grapes of the best quality for the making of the most superior wines, will make equally good wine from all kinds of grapes. In order to make the best quality of wine, such localities must also have those varieties of grapes that make the best quality of wine. Johannesburg, without the Riesling, would soon lose its reputation for its fine quality of wine. Plant Chateau Lafitte with the Mission grape and the time would not be long when its name would drop out of existence as a locality for fine clarets. Of course locality, climate, and other causes have a marked effect on the quality of wine, and all conditions must be favorable to make a wine of the first quality; but I mean to say that the variety has more influence than any one other condition.

Perhaps there is no locality in California which is so little understood as to its climate as Los Angeles and other southern counties.

I am often met, when in Stockton, Sacramento, and other places in the State, by the query, "Well, it must be very hot in your county now?" whereas the fact is that our Summer heat is much less, and our nights are much cooler, than is the case at either place mentioned. We have but little hot weather, but a more even temperature, warmer Winters, and a longer season. As this is the home of the orange, lemon, and other like fruits, the mistake is a natural one, but we excel in raising these, not because we have a greater Summer heat, but because we have a warmer Winter and a more even temperature for the whole year. It is no longer an experiment whether we can make a light wine of the best quality. It is a fact accomplished—a fact which all viticulturists who have tried our wines, admit. I can show wine in quantities which only carries seven per cent. of alcohol, and it can be drank with pleasure when one is dry, to quench thirst, and leave no dullness of the mind behind. Of course, this cannot be done with the Mission grape, and the verdict founded on that grape has been a just one, which said that we could not make a light wine, and that all our wines had a sherry flavor. The planting of other varieties of grapes, however, tells a different tale. The planting of Blaue Elben, Burger, Zinfandel, and Charboneau, changes this verdict, which was based upon wine of every kind and variety made from our grape, viz.: the Mission.

Our future, too, is brightening in other ways. We will soon have a transcontinental railroad, with several arms reaching to every part of our continent, and will not be handicapped by having to send our product to San Francisco before we can begin our shipment to the eastern cities. This was a heavy burden to the wine interest. We can now fairly claim that this district has advantages abreast, at least, with the most favored in California, in all respects, and it will be excusable in us if we show ourselves to be a little over jubilant for good taste, and indulge a little too freely in California boasting. We really have something to be proud of.

Little can be said by me of any other counties in my district in this report to you, except as to Los Angeles and San Bernardino Counties, for these two counties now have at least nine out of every ten acres of vineyards in this district. I have sent our printed form of questions to all the counties to different parties, but none have favored me with a reply excepting Dr. W. F. Edgar, of San Bernardino, whose reply is here before you. I have, too, applied to all the different County Clerks for maps of their respective counties, but such maps have not been sent me, perhaps for the reason that there are none. The only one which I have been able to obtain is the one accompanying, of Los Angeles County, and I have had valuable assistance in placing the different vineyards upon it, and giving names of owners and acres, from Messrs. Fanning and Brierly. It required much work to get it in the present shape.

In San Bernardino County there are other vineyards besides Cucamonga, which is given on the map of Los Angeles County, owned by Dr. Barton, Mr. Crafts, Mr. Pain, Dr. Edgar, and Mr. Pishon, amounting to about two hundred acres. There is also an awakening to the viticultural interest in that county and Ventura and San Diego, all of which are buying the finer varieties of grape cuttings for planting.

Riverside has many small vineyards, planted generally with Mus-

cat of Alexandria and Muscatella Gordo Blanco, from which a very fine quality of raisins are made.

From the accompanying map it will be seen that there are five thousand seven hundred and thirteen acres of vineyard, representing about three hundred owners. Taking the present year's yield, which is the largest we ever had, at ten thousand pounds to the acre, it gives fifty-seven million one hundred and thirty thousand pounds of grapes produced in this county this year; and, taking fifteen pounds of grapes for a gallon of wine, this would give the grand total of three million eight hundred thousand gallons of wine.

These figures seem large, even to me, yet I cannot see how I can make them less. I am in a favorable condition to make estimates, for I have bought the product of many vineyards for several years, and this year have bought over twelve million pounds of grapes. Although five tons to an acre, as an average, may seem large, yet several vineyards which I bought yielded ten tons, and I believe five tons is within the fact. The vineyards of this county are generally in full bearing, and enough has been unavoidably omitted to make those good that may not be in full bearing.

In estimating the wine product for this year at three million eight hundred thousand gallons, it is based upon the supposition that all was made into white and red wine. This is, of course, not the case; for much has been made into sweet wine, which requires more than fifteen pounds to the gallon, and much has been made into brandy. Were I to estimate the production of this county I would say that there had been made two million gallons of white and red wine, five hundred thousand gallons sweet wines, and three hundred thousand gallons of brandy.

Had I had the time I would have visited the different wine makers, and perhaps gotten more exact figures; yet it is a hard matter to do so, for no one wishes to appear as making less than his neighbor, or to give the kind of wine made, but for this season there has not been time, for at the present writing grapes are not yet all crushed. There are several large manufactories for wine making in our county, and all have had all they could do. The more prominent are Dreyfus & Co., Kohler & Frohling, Mr. Bernard, J. DeBarth Shorb, M. Keller, and Stern & Rose. There are very many more who work up their own grapes; and, generally, all the vigneron of Anaheim belong to that class.

Probably half the vineyards of this district are irrigated; and, although grapes can be grown in any part of this district without irrigation, yet with irrigation larger crops are produced and vineyards retain their fertility and thrift for hundreds of years. Irrigation entails much work, and it may yet be considered an open question which pays best—deep tillage, without irrigation, or irrigation. Lands without irrigation can be bought very much cheaper, say for one fourth, and this again forms a factor in the problem of "Which pays best?" It must, however, be confessed, that as long as the belief prevails that irrigation is a preventive of the phylloxera, there is a comfortable feeling in having water.

Of course, like the balance of the State, we have thousands of acres which are adapted to the growing of the vine. Men and money are all that are required to make vineyards by the ten thousands, and I doubt whether a better climate or soil can be found even in this State for the production of grapes of the best quality. Land, too,

can be had cheap enough, say from ten dollars to one hundred dollars an acre—the first without irrigation, the latter with it. Nor would it follow that the cheaper land would be the poorest for grape growing, for the reverse might be the case. Our mountain slopes and our uplands are now the lowest in price, and yet these lands are the lands that will produce grapes of the highest value. The possibilities here are immense. A great future is in store for us, if it is a fact, and I believe it, namely, that Europe will buy our wines.

It may be safely stated that grapes grown for sale to wine makers, this year, have netted ninety dollars an acre, for the crop was large and the price good. The average price this year was somewhere near twenty-one dollars a ton. The wine and brandy made would sell to-day for over a million of dollars.

Much more might be said, but time does not permit. It has been with difficulty that I have been able to do this much, and I will promise myself the pleasure of resuming the subject at some future time.

L. J. ROSE,

Commissioner for the Los Angeles Viticultural District.

## REPORT OF MR. CHAS. A. WETMORE,

COMMISSIONER FOR THE STATE AT LARGE.

SAN FRANCISCO, December 22, 1880.

*To the Board of State Viticultural Commissioners :*

GENTLEMEN: Being a member of your honorable Board "for the State at large," and having no special district duties to perform, I shall devote my attention in this report, which I respectfully submit, to sundry topics of general interest to the viticulturists of the State of California.

## THE WILD VINES OF CALIFORNIA AND ARIZONA.

The wild vines of America are at present commanding the attention of viticulturists throughout the world. This unusual interest is caused by the discovery that, with one exception (the *Labrusca*), all the species yet experimented with in the districts of France, most affected by phylloxera, have proved to be proof against the severest attacks of the insect. Of the nine species described by botanists, viz.: the *Reupestis*, *Cordifolia*, *Riparia*, *Arizonica*, *Californica*, *Aestivalis*, *Candicans*, *Labrusca*, and *Vulpina*, only the *Californica* and *Arizonica* have yet to be tested in phylloxerated vineyards. All the others, excepting the *Labrusca*, are found to be resistant.

Of the several hundred cultivated varieties of the *Riparia*, *Aestivalis*, *Labrusca*, and *Vulpina*, all partake, more or less, of the strength or weakness of the mother stocks, with this apparent distinction, viz.: the degree of resistance of the cultivated varieties varies generally in proportion to the improvement which culture has accomplished, the varieties being weakened as they are improved as fruit bearers. If there are exceptions to this rule they only serve to prove it.

The cultivation of these stocks may be practiced for either of two purposes, viz.: first, as substitutes for the so called European vines of the species *vitis vinifera*, without grafting, in which case selection is made of the most valuable fruit bearers; second, as grafting stock to bear and preserve the esteemed varieties of the *vitis vinifera*, in which case only the resistant power of the graft bearer and its adaptability for grafting are to be considered important.

For the present, it is improbable that viticulturists of California will look with favor upon these wild species, or their improved varieties, as substitutes for the "European" vines; present demand for them will be generally limited to their usefulness as graft bearers. While this is true, I think it is however probable that many of our native varieties will become, in the course of time, equal in value as fruit bearers with their more distinguished European cousins.

In searching for grafting stocks, our viticulturists should not place too much reliance upon the careless statements and recommenda-

tions of vine growers of States east of the Rocky Mountains. An inquiry for a phylloxera-proof variety, directed to a grower in Missouri, Ohio, Texas, etc., would very naturally bring a response in favor of some vine cultivated in those places for its fruit. In the eastern half of the United States, the European vine (or Asiatic *vinifera* species) does not flourish. American energy has proved itself in nothing more than it has in the earnest, painstaking, and successful efforts of vine growers to improve the wild vines found in the woods, along the rivers, and in the mountains of the "new world." What they have already accomplished ought to be an incentive to the people of our more favored viticultural regions. We have a great deal more to do and to learn than we have yet done, to be proud of; we may boast of our soils and climates, but nature gave those to us ready-made; we may boast of our fertile vines, but we borrowed them from Europe; we may boast of our good ordinary vines, but we borrowed our knowledge and generally our talent from Europe; we borrow our knowledge of the phylloxera from Professor Riley, whose researches were made while State Entomologist of Missouri, and from Professor Planchon, who was sent by France to the United States to study the habits of the insect; we borrow our knowledge of the resisting power of American vines from the National School of Agriculture, of Montpellier, France, and the Agricultural College of Missouri; we borrow our viticultural instructions, excepting that acquired through the hard and slow "rule of thumb," from French books and schools, and the works of viticulturists of Missouri and Ohio; we subscribe for viticultural papers published east of the Rocky Mountains; we accept the princely gift to this State, made by Colonel Agoston Haraszthy in 1860, who brought us hundreds of varieties of valuable grapes from Europe, including our now famous Zinfandel, but whose noble efforts were so little appreciated at the time by the State that the Legislature neglected to pay his expenses while traveling as a State Commissioner; we boast of a State University with its Agricultural College, notwithstanding it is unable, for want of means and suitable experimental fields, to impart as much instruction in grape growing as is provided by the intelligent foresight of the State of Missouri, whose agricultural professor is already an authority in viticulture, called upon by our people for advice as well as selections of vines. I do not mean to disparage the great progress we are making in this industry, nor the great value of individual efforts that have been made in its behalf, but I do charge that the public spirit of this State, as a collective body, has done very little in fostering productive industry, while it has expended its force lavishly in fostering the manipulation of the results of labor. We cannot close our eyes to the fact that we are lacking in many advantages for study and facilities for industrial progress, which the State should supply, and that the people are only now awakening to a consideration of their backwardness in all that pertains to the application of science in aid of industry. Our students should not be obliged, by necessity, to go to Missouri, the District of Columbia, or France, to find schools which teach us how to do our own work, to study collections of vines, which we ought to have established here when Colonel Haraszthy brought the nucleus to begin with, or to study entomology, which is of far more interest to our State than to any other in the Union.

These preceding remarks I deem to be necessary to counteract a



popular disposition at the present time to glorify the State in consequence of the present financial success of our viticulturists to boast of the trifling production of six to twelve million gallons of wine annually, which ought, by this time, if it had been fostered by the State and people, to have been at least one hundred million gallons of superior quality, and then only in a condition of infantile health, for we have not half seconded the free offerings of nature and the enterprise of a few citizens. It is not to our credit that we can learn nothing of practical value from the experience of the Sonoma Valley, where the phylloxera has existed as long as it has been known in Europe, while we turn for aid to France, who sent a scientist to America as soon as she discovered that one of her industries was menaced by a disease, knowledge of which might be obtained on this side of the ocean.

I was led to this thought in reflecting upon the fact that of all the species of indigenous American vines, those of our own coast are the only ones concerning which we are ignorant; that, while Sonoma wine growers are importing vines from Missouri and neglecting the virtues of those that grow wild in their own valley, France, Portugal, Spain, Italy, and Australia have eagerly seized upon our *vitis Californica*, acting upon the first intimation that it was worthy of experiment.

A laudable movement has been started by the Honorable Horace Davis for the establishment of a branch of the National Agricultural Bureau on this coast; if accomplished, it would undoubtedly be of value to us; but while this should be done, it will be a confession of infantile impotence, unbecoming a full grown and independent State, having resources of its own, if we fail to establish under our own control all the agricultural stations that we need for the aid of our own peculiar agriculture.

During the hours and days that I have been able to spare from private business, I have been able to learn enough, aided by the generous assistance of private citizens in this State and Arizona, concerning the wild vines of the Pacific Coast, to convince me that they are worthy of cultivation: First, to provide grafting stocks for noble vines; secondly, to experiment with in search of new and valuable wine grapes. Botanically all that is known of them may be said in the words of Dr. G. Engelmann, whose valuable manual of American grapevines is published in the "Bushberg Catalogue," viz.:

"*Vitis Californica*, Benth. The only wild grape of California, has rounded, downy leaves and small berries, and is not made use of as far as known. The seeds are obtuse, with a short beak, elongated chalaza, and very slender raphe.

"*Vitis Arizonica*, Engelm. Similar to the last, but tomentose only when young, later glabrous, with middle-sized berries, reported to be of a luscious taste."

The *Californica* flourishes in the wild state in all the viticultural regions of California, from San Diego to Shasta; from coast valleys to the foothills of the Sierra Nevada. It is found in low and in high altitudes—but generally along streams of water and in shady cañons. I have even found it on high ground at a distance from water, as for instance on the plateau of Howell Mountain. There are few, if any, places in the State, especially noted for their adaptation for viticulture, where the wild vine is not found growing luxuriantly. A very accurate painting, illustrating the foliage and fruit of the *Californica*, has been made for me by Miss Ada Camden, of Shasta County.

The *Arizonica* flourishes in Arizona in mountainous regions from Prescott to Tucson. My researches in this respect lead me to believe that there are either several very distinct varieties of this species, or there are other species in Arizona, which may not have been described. I have received this year fruit gathered in the mountains near Prescott at six thousand feet altitude.

One year ago, when I commenced these studies, I was told by Mr. Mattier, who was assisting me at Harbin's Springs, in Lake County of this State, that he could detect five varieties of the *Californica*; he then produced for me three distinct samples of wine, each materially different in color and character. This year, after more careful observation, he replied to my question: "How many varieties do you find?" "As many as there are vines!" The latter statement is probably near the truth—each vine, being a seedling grown on varying soil under varying circumstances, develops peculiarities of its own. Therefore the field of research in seeking the most valuable for propagation of cuttings is wide enough to satisfy any industrious ambition. His success this year in selecting fruit from single vines and fermenting the juice separately gives abundant reason to hope that among these vines valuable varieties for wine making will be found.

So far as experiments have been made in planting cuttings of the *Californica*, it appears that they take root slowly and with difficulty; on the contrary, however, plants may be grown from the seed with the greatest ease. Seedlings of this year's growth may be seen flourishing vigorously at Berkeley, St. Helena, Santa Clara, Los Angeles, and elsewhere. No more difficulty is encountered in causing the seeds to germinate than is common with beet or carrot seeds. The precautions which I have observed apparently necessary, being not to sow too early, lest the weeds overgrow the nursery before the seeds sprout, rendering weeding dangerous, and not to sow too deeply—half an inch depth in good garden or nursery soil being sufficient, and the time of sowing being about the first of April, the seeds having been soaked a little in water. Wherever the seedlings have been started not too thickly, with from four inches to a foot space between them in the rows and at least eighteen inches between the rows—in good soil, the young plants have generally attained in this season a height of from two and a half to three feet, with more or less lateral growth, and butts from one third to half an inch in diameter. Pruning them judiciously in the Spring will probably produce good sized butts next season, amply stout to support any graft; most of those well cultivated the first year might do well to graft the following Spring.

Concerning their adaptability as grafting stock, I have no longer any doubt, and I feel certain that the seedling roots will prove vastly more useful to graft upon than rooted cuttings. It is easier and cheaper to produce vigorous seedlings than weak rooted cuttings. A pound of seeds collected this year by Mr. Mattier, which he offers for sale at a dollar, will furnish at least four thousand germinating seeds. (The seeds as collected contain dead as well as the sound ones and the husks of the broken berries.) An acre of ground sown in drills eighteen inches apart—seeds four inches apart—would produce about sixty thousand seedling roots. At ten dollars per thousand—the average price of Missouri cuttings delivered here—an acre would yield six hundred dollars worth of seedlings. A seedling one year

rooted would be worth more than a cutting unrooted. If only one half were sufficiently developed for grafting the second year, this method of propagation would still be profitable.

The most satisfactory proof of the adaptability of this vine for grafting with *vinifera* stocks, I found in the vineyard of Mr. Charles Lefranc, in Santa Clara County. Twenty-four years ago, desiring to utilize his imported cuttings to the best advantage by cutting them in short pieces, he grafted quite a considerable number on wild stock taken from the cañons near his home. Fortunately for our present study, those grafted vines to-day are still preserved, and are equally as flourishing as any others in his vineyard. I neglected to take a note of all the varieties thus grafted, but all seemed to be growing equally well. I remember seeing, besides varieties of French wine grapes on this stock, a fine Flame Tokay, which was climbing a trellis.

What effect the graft may produce upon the root of the grafting stock, is not definitely known. A theory has been advanced in the East that grafting on phylloxera-proof stock will prove useless, because, as some claim to be true, the graft will change the root entirely, so that in a few years the latter becomes the same as if the graft had been planted as a cutting. This certainly is not true of the *Californica*, the proof of which may be found in Mr. Lefranc's vines grafted twenty-four years ago. That the graft exerts some influence upon the root is evident, because the suckers from the latter, which were found quite common, bore leaves resembling in shape those of the graft; but the texture and surface of the leaves of the suckers, or sprouts, were apparently identical with those of original vines in the wild state, the under surface woolly and the color the same shade of green. More important in proof of this was a sprout from the root of the grafted Flame Tokay, which was this year bearing bunches of small wild fruit alongside of the grand clusters of Tokays, the fruit of the sprout being improved somewhat by the culture it had received.

The most important discovery of the year, however, in this respect, has been made by Mr. Mattier, at his little Hermitage, near Harbin's Springs. He has taken short pieces of roots of the wild vine, cut six to eight inches in length—*ad libitum* anywhere among the roots torn from the ground—pieces of about one third to half an inch in diameter, and grafted upon the upper ends minute slender pieces of canes of cultivated vines, one inch to an inch and a half long, closing the union with grafting wax, bound with cotton strips, and planted them in the late Spring alongside of stout cuttings of the same cultivated varieties. The results were astonishing. I personally examined them in the latter part of November. The soil being very favorable the ordinary cuttings made wood three feet long; but all of the little grafts on wild roots had grown *from ten to fourteen feet*, making stout stems of more than ordinary thickness, full of rich and swelling buds. I remember one of the grafts was from Mission wood, another from Pinot. The power of the *Californica* root to invigorate the *vinifera* graft could not be more satisfactorily demonstrated. Only in one case had the graft taken root, the point of union having been placed too deeply in moist soil.

There remains, I think, only to be demonstrated by actual experience what varieties may with most advantage be grafted on *Californica* roots, and whether, under the same conditions, better results may be obtained in this way than with other American wild stocks,

and, more important, whether these roots are actually phylloxera proof when subjected to the test in infected vineyards.

Concerning resistance to the phylloxera, a great deal may be learned in advance of experiment by careful examination of the wild roots by means of the microscope and chemical analysis. Microscopic examination will determine whether the bark is of dense structure, which Professor Foex, of the Montpellier School, considers the cause of the resistance of American vines. Chemical analysis, such as is referred to in one of the exhibits to the report of your Committee on Phylloxera, etc., will determine whether they contain resinous principles in proportions analogous to those of the roots of resistant vines, which have been analyzed and reported upon.

In the absence of these preliminary tests, we have many reasons for believing that the *Californica* is a resistant vine. First, because, although found growing wild, in the immediate vicinity of vineyards dying from phylloxera, no sick or affected wild vines have yet been observed, and their roots having been examined, have not been found affected; second, because a mechanical examination of the roots is sufficient to show the unusual compactness and toughness of their fibers; third, because all other American wild vines (excepting varieties of the *Labruscas*, which are very different in character from the resistant vines) are resistant. These reasons make probability very strong.

No really satisfactory test has yet been made in any of our diseased vineyards with the *Californica*. Mr. Appleton this year planted two specimens among the phylloxera, and noted results. The plants grew very well through the Summer. In the Fall he observed one looking sickly, and taking up the roots found them covered with phylloxera. This caused him to believe that this vine would not resist. His experiment is defective in extent and time. Resistant vines, when first placed in infected spots, are attacked like all others by the pest; the test of resistance, however, is that the resistant vine will outlive the attacks and gradually free itself of the pest. Placing a new plant in the midst of insects multitudinous and hungry, before it has had time to strike down its tender roots, in poor soil, dry and clayey, is a severe test, because the new and first rootlets are easily injured. Time only can prove whether it can live and rid itself of disease by failing to furnish its sap to nourish the insect broods from its wounds and sores, or whether, when once rooted, it is subject to attack. I believe that, fairly tested, it will succeed; not by using slow growing cuttings, but by the seedling roots, all ready to grow, or by the system of grafting pieces of roots, as tried this year by Mr. Mattier. Unfortunately, so far, the best experiments with this vine have been made where there is no phylloxera. Next Spring, however, there can be no excuse for not trying the one year old seedlings, which can now be obtained for use in infected places.

Concerning the value of the fruits of the *Californicas* and *Arizonicas*, I have considerable more to offer now than I had last year. Mr. Mattier has been fermenting larger quantities of the *Californica* fruit from selected vines. By selecting them he has avoided nearly all that was unfavorable in his experiments last year—proving that for wine purposes the vines must be carefully selected and propa-

gated at first from cuttings. The test of its wine producing capacity can never be entirely fair until the vine has been cultivated. In its wild state it grows to wood in places unfavorable for fine fruitage—over oak trees and in thickets—many of the vines covering large areas of ground and distributing their virtues through thousands of bunches of small berries in which tannin and acids predominate. Later on, fair analyses of sufficient quantities of the wine fermented will be made; preliminary tests of new must, in small quantities, will be referred to at the present time.

Through the kind assistance of General T. J. Butler, of Prescott, Arizona, I have succeeded in obtaining two small lots of fruit from wild vines growing in his vicinity, the seeds of which have been saved. The first lot came from an altitude of six thousand feet, near Prescott. The leaves accompanying the fruit did not resemble others from Arizona, which were undoubtedly of the *Arizona* species; they resembled the leaves of the *rupestris*, as described by Dr. Engelmann, and may have been of that species—or some new one. A painting of the fruit and leaves was kindly made for me by Miss Minnie Woodward of this city, for future reference. The second lot of fruit was, without doubt, from the *Arizona*. Part of the seeds have been distributed outside of the State; the rest will be sown here this coming Spring. I received also through the agency of General Butler, several samples of wine made by different parties from the wild grapes of Arizona. One of them from a white variety, growing along the Verde River, was very interesting.

The samples of fresh juice and fermenting musts of these *Californica* and *Arizona* grapes were submitted by me to Professor Federico Pohndorff, a most skillful and experienced œnologist, now of this city, from whom I received the following reports:

SAN FRANCISCO, November 21, 1880.

Charles A. Wetmore, Esq.:

Only two of the several samples of wines from wild grapes of Arizona, you sent me for examination. I was able to consider up to this moment, and owing to my want of leisure, could only scrutinize them rather superficially.

One is the bottle of must pressed through a towel from their accompanying skins, on the fifth instant.

The juice having fermented without contact with these husks, has nevertheless a grand, though deeply brownish, rather than a ruby or bluish color.

The skins, fifteen ounces in weight, fresh, but without liquid, I put to two ounces of cane sugar and eight ounces steam-condensed water.

On the tenth instant I racked the must of the bottle, in order to prevent micoderma from forming on its surface. The lees I allowed to solidify. Fermentation of both the must and husk wine proceeded well, although I had no means of favoring it by evenness of temperature.

With still four per cent. of saccharine yet to be fermented, the must contains at present 7.85 per cent. of alcohol. Thus, after finished fermentation, it will be about 9.70 per cent., a power sufficient to keep the wine, notwithstanding its astounding content of nearly thirteen per mille of free acids and a considerable amount of tannin. For potable purposes, the must by itself would be too harsh in taste, but nothing would be in the way, if fermenting the juice of that kind of grapes like red wines on the husks, to use it in the press for blending with musts of noble grapes.

The amount of color of the husks wine is enormous and confirms the supposition of the extreme usefulness of the wine as a color-giving medium in blends with light colored reds. Extractive matters would at the present stage of the must and husk wine together doubtless weigh above four per cent.

The distillate of the alcohol test has an agreeable free taste and a good flavor. For brandy purposes, therefore, the Arizona wild vine would be profitable, as its alcoholic yield surpasses that of the vines of Charante, the Cognac district in France.

No volatile or acetic acids seem to so far have generated in your sample, and with proper care bestowed on the product of the vines it would present no greater danger in a cellar than the wine of cultivated vines has to run. Carbonic gases are still in considerable proportion in suspension in the samples.

The next sample examined is No. 3, from wild grapes from Ash Creek, Prescott, Arizona, made by Mr. Dan. Hatz. The label on the bottle states that the liquid of thirty-five gallons of grapes, sugar and water added, proportions not given, was sixty gallons. Its alcoholic content thus far, the must still being in fermentation, is 8.3 per cent., and of free acids about 10.85 per mille are found. The amount of saccharine still to undergo fermentation may be 3 per cent. Its color is particularly deep, its taste, if not very expressive, still fruity, resembling a vinous taste, and doubtless, rightly proportioned, the addition of its grapes to the press-mass of red grapes of vineyards, would be useful both as to color and even mildness of taste, the amount of free acids notwithstanding.

Shortly more about the above samples and others you submitted to my examination.

What little I have an opportunity of seeing of the subject you so patriotically have taken in hand, the demonstration of the importance of the wild vines for the future of the vine plantations, cannot but justify me to congratulate you on the energy of your endeavors for the public good, which will be surely recognized by thinking viticulturists. There can be no risk, and there is evidently profit in civilizing the wild vine.

F. P.

SAN FRANCISCO, December 15, 1880.

Charles A. Wetmore, Esq.:

DEAR SIR: Resuming my report on different samples of wines from the wild vine *Californica*, I have to say, first, about the two samples from Harbin's Springs, that both, received on the twenty-sixth of November, were racked December first and December fourteenth.

In the first I found, yesterday, 8.1 per cent. alcohol developed, and the precipitates were considerable. Free acids, 8.7 per mille and a small fraction. Color, deep rich ruby, superior to that of any wine from cultivated vines in the State. Taste, vinous, fruity, in counterdistinction to a berry taste; no disharmony of extractive or unconverted saccharine, and, save a pronounced predominance of harsh tannic taste, not dissimilar to that of very ordinary cultivated grape wine. The sample is too small to admit of new tests which may yield a fraction more of alcohol. An addition of juice of the Harbin Springs wild grape to the press-mass of Mission grape must, if properly proportioned, would probably not in the least prejudice the quality of the latter, whilst its color would be largely enhanced by the coloring power (three colors) of the wild grape.

The second sample of 1880, Harbin Springs Red, from the bunches of *one single vine*, yields, in yesterday's test, the astonishing proportion of 11.45 per cent. of alcohol; free acids, more than 9 per mille, and a large amount of tannin, salts, and alkalies in the 35 per cent. of liquid lees of the mass. Taste, absolutely dry; thus sugar seems all converted, but a great quantity of carbonic acid gas is remaining. Color, very deep ruby, with a slight tinge of brownish red. Taste, good, free of berry taste, vinous, not unpleasant of the racked wine. Distillate, good, grape spirit like.

The fact of this liquid being from one vine full of bunches, and withal having the amount of saccharine to develop the proportion of about  $11\frac{1}{2}$  per cent. of alcohol, speaks volumes for the extreme usefulness of this kind of vine. Even if used in hedges, the abundance of bunches it seems capable of producing would constitute a source of an income, applying its juice for distilling, as without any cultivation it yields as much alcohol as cultivated vines. But as it can and ought to be used for wine purposes, its extraordinary deep color will still more recommend it. Add the resistance the wild vine shows, as is supposed, against phylloxera attacks, and surely the qualities of the vine will be recognized by the progressive planter.

Samples from Arizona Territory wild grape wines, No. 1, that made by Mr. Dennis Miller, at Big Bug, twenty miles from Prescott, received November fifth, racked November nineteenth and December sixth, yielded 8.9 per cent. alcohol; free acids, 11.3 per mille; in its extractives, alkalies and salts; some saccharine still in solution. Taste, earthy, but vinous withal, and, notwithstanding the objectionable impression it produces on the palate, to be classed as of wine. Method of elaboration not stated, but it might be supposed that if properly made, and especially if the vine were grown in soil with less niter for the root food, its juice would taste more freely fruity and pleasant. Color, grand and powerful, like the greater part of the samples. Distillate, good, grape brandy-like, but slightly salty.

No. 3, sample of wine from the white wild grape, made by Mr. James Davis, Verde River, Arizona Territory. Alcoholic test this day, 8.25 per cent., with saccharine still unconverted. Free acids, 8.1 per mille. Color, not white, but from too prolonged contact with the grape skins, reddish. Taste, free vinous, although still sweetish, but really not inferior to many of the imperfectly fermented young Mission wines.

No. 4, sample of two years old red, from wild grape, made by Mr. J. D. Cook, Willow Creek, Arizona Territory, five miles west of Prescott, has passed through the testing apparatus twice without yielding any alcohol, so that, as the manner of its manufacture is not stated, and from its bright state and sweet, fruit-like taste, it must be presumed to be a preserved juice rather than a wine. Its taste and flavor, however, are those of a delicious port-like wine, without any of the spirituous additions to the taste of the same, except that of a great content of ethers, which are generally present in liquids of rich alcoholic contents.

Nothing would take away from my mind the impression, that in the wild vine we shall have a valuable addition in the vineyards where that plant will be adopted.

Yours, truly,

F. POHNDORFF.

Samples of seeds of the *Californica*, collected for me last year, besides being distributed in this State, were sent to Professor Husmann, of the University of Missouri; Professor Foex, of the National Agricultural School at Montpellier, France; A. H. Trimoulet, of the Viticultural Union of the Entre-deux-Mers, France; the French Department of Agriculture and Commerce; Messrs. Offley, Forester & Co., London (whose vineyards are in the Douro, Portugal); the Phylloxera Commission of the Douro, and the Italian and New Zealand Governments. The following reports, indicating the interest taken in this vine, have been received:

UNIVERSITY OF THE STATE OF MISSOURI, }  
COLUMBIA, MO., August 11, 1880. }

DEAR SIR: Your favor received. Only about a dozen plants of the seeds you sent have come up. I think they must have been too dry. We have a terribly dry season here, and they have made but little growth, but show entirely different characteristics from any of our grapes here.

Yours, truly,

GEORGE HUSMANN.

DEPARTMENT OF AGRICULTURE AND COMMERCE, }  
NATIONAL SCHOOL OF AGRICULTURE OF MONTPELLIER, }  
VITICULTURAL STATION, MONTPELLIER, April 6, 1880. }

DEAR SIR: Permit me to thank you for your kindness in sending me seeds of the *vitis Californica*. I am infinitely obliged to you for having remembered my request, for we (Professor Planchon and myself) have had a great desire to possess this variety, which has not before this been imported into Europe. Thanks to your kindness, we are going to have an opportunity to study it.

The tendency toward the plantation of American vines becomes more and more established with us, by reason of the failure of insecticides in places which have been for a long time attacked by phylloxera. The types which we prefer are, for the sake of their fruits, the Jacquez (or Ohio, Cigar box, etc.) Herbemont (or Warren), and the Black July (or Devereux Lenoir.) For grafting stock we prefer the wild *vitis Riparia*, which is sent to us from Missouri, Iowa, and Kansas, and the *vitis Rupestris*, from Texas.

I take the liberty of addressing to you by this same mail a little pamphlet containing a resume of practical lessons in grafting American vines, which I gave a month ago at the College of Agriculture.

Accept, dear sir, my kindest regards, etc.,

G. FOEX.

CHAS. A. WETMORE, San Francisco, Cal.

SAN FRANCISCO, December 11, 1880.

Charles A. Wetmore, Esq.:

DEAR SIR: I have the pleasure in stating that the parcel *vitis Californica* seeds, which you were good enough to give me for distribution in New Zealand, arrived safely at their destination and give good promise of success.

Mr. J. C. Firth, a large land owner in Auckland, who takes great interest in acclimatization matters, received a parcel of the seeds direct from me. He writes under date November 9th: "I have sown a portion of the vine seed you sent me, and it is doing well. I will plant them extensively at Mata Mata (an inland district of Auckland), where vines do very well."

The New Zealand Government, to which I sent the bulk of the seeds, has distributed them very extensively, together with a printed extract from your pamphlet "On the Propagation of the Vine," for the instruction of growers.

I have requested the New Zealand Government to have a note of the results made and communicated to me for the information of the Viticultural Commission and California vignerons generally. I have no doubt this will be done, as the Colonial Secretary writes to me: "The seeds of the wild vine have arrived and been distributed to persons who will be likely to make good use of them, in accordance with your suggestions."

I am, dear sir, very respectfully yours,

ROBT. J. CREIGHTON.

The greatest interest has been manifested in this vine by the Phylloxera Commission of the Douro, Portugal, of which Mr. Forester, the son of the distinguished Baron Forester, whose efforts to promote the improvement of Oporto wines were so successful, is a member.

About fifty pounds of last year's seeds were sent to Mr. Forester, since which time he has visited this State and ordered twenty pounds more. He was much pleased with the rapidity of growth of the seedlings under glass in London.

The seedlings of the first lot of seeds distributed last Winter have been named by Mr. Mattier, *Matildas*, to distinguish them from future selected assortments. His collection of seeds this year, now offered for sale, has been made from selected vines.

Monsieur G. Morlot, manager of one of the largest properties in Haute Marne, France, has repeatedly written inquiring about the *vitis Californica* and *Arizonica*, since the publication of notices of these experiments. Recently he has ordered large quantities of seeds and cuttings, and all the seedlings (*Matildas*) that can be obtained. One hundred and fifty pounds of seeds and 20,000 cuttings will be sent to him.

#### THE WILD VITIS VINIFERA.

The wild vines, from which the European cultivated varieties have sprung, are all classed under one species botanically, whereas, in America, botanists have described already nine distinct species. The *vitis Vinifera* is generally supposed to have originated in Asia, so that in France, what we generally call the European vine, is generally called the Asiatic. There is room, however, for disputing the theory that all the European vines came from Asia, although botanically they may be all of one species. Wild vines are found in Europe, and that their origin need not be attributed solely to accidental wild stocks forming from seedlings of cultivated vines, is shown in an interesting manner in the standard work of Thudicum & Dupre, who call attention to the fossil grape leaves found in Germany.

Certainly, however, it is true that most, if not all of our leading varieties of wine and table grapes imported from Europe, have been propagated for many centuries—most of them at least two thousand years—without recourse to the seed, viz.: by cuttings only. It is safe to say that the vitality of our foreign varieties is generally at least two thousand years old.

It is not known in what proportion any of our valued wine grapes will reproduce themselves from the seed without material variation in the fruit; nor what varieties will reproduce a general average good result in fruit from the seed suitable for fermentation, if not for table use. It is my belief that many of our wine grapes, if propagated from the seed rather than by cuttings, would produce better plants with better roots, and the fruit, though varying, would in the average result, operated under the wine press and in the blending vats, be equally valuable with the fruit obtained from rooted cuttings. Some barren plants would, undoubtedly, be produced, but these, bearing only male flowers, might be left to assist the hermaphrodite plants in fructifying, or might, together with deteriorated seedlings, be grafted. Concerning these male seedlings, I will quote a paragraph from Dr. Engelmann, in the "Bushberg Catalogue," viz.:

"All the true grapevines bear fertile flowers on one stock, and sterile flowers on another separate stock, and are, therefore, called *polygamous*, or, not quite correctly, *diœcious*. The sterile plants bear male flowers with abortive pistils, so that, while they never produce fruit themselves, they may assist in fertilizing the others; the fertile flowers, however, are hermaphrodites, containing both organs, and capable of



ripening fruit without the assistance of the male plants.\* Real female flowers, without any stamens, do not seem ever to have been observed. Both forms, the male and the hermaphrodite, or, if preferred, those with sterile and those with complete flowers, are found mixed in the native localities of the wild plants, but only the fertile plants have been selected for cultivation, and thus it happens that to the cultivator only these are known, and as the grapevine of the Old World has been in cultivation for thousands of years, it has resulted that this hermaphrodite character of its flowers has been mistaken for a botanical peculiarity, by which it was to be distinguished, not only from our American grapevines, but also from the wild grapes of the Old World. But plants raised from the seeds of this, as well as of any other true grapevine, generally furnish as many sterile as fertile specimens, while those produced by layering or cuttings, of course, only propagate the individual character of the mother plant."

More interesting instruction on this and other topics may be obtained by studying Dr. Engelmann, in the "Bushberg Catalogue," published by Messrs. Bush, Son & Meissner, St. Louis, Missouri. I believe that many of our best European wine grapes are simply varieties of wild vines, cultivated without hybridization, and if so, may be reasonably relied upon to produce themselves fairly from the seed, a portion, or all of the male seedlings, being grafted. There is a large class of vines, cultivated in Germany and around the base of the Alps into Austria, which have clinging to their names the words *Sylvaner*, or *Zierfahndl*, each denoting some tradition of sylvan origin. Our word, *Zinfandel*, has been corrupted from the latter.

The best authorities on the Rhine grapes, while discussing their origin, incidentally have said that no accidental seedlings have yet produced new varieties of the Riesling. If this be true, may we not, with some confidence, plant the Riesling seeds?

I have been unable to procure the evidence of our viticulturists concerning experiments with seedlings, no responses being made to my published circulars. Generally seeds have been planted only to procure new varieties, and hybridization has been practiced. Hybrids, no doubt, there are many among our cultivated vines, and these would prove unreliable for seedling vineyards. Careful experiments should be made to test these questions of fact.

There is now growing at Mrs. Blanchar's vineyard, in Napa County, a seedling Muscat, eight years old, which has been bearing fruit, apparently fine, since the fourth year. Mr. Groezinger reports having seen at the same place seedling Zinfandels, bearing fruit equal

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\* "These fertile plants, however, are of two kinds; some are *perfect hermaphrodites*, with long and straight stamens around the pistil; the others bear smaller stamens, shorter than the pistil, which soon bend downward and curve under it; these may be called *imperfect hermaphrodites*, approaching females, and they do not seem to be as fruitful as the perfect hermaphrodites, unless otherwise fertilized.

"It is proper here, to insist on the fact that nature has not produced the male plants without a definite object, and this object is, without any doubt, found in the more perfect fertilization of the hermaphrodite flowers, as it is a well established fact that such cross fertilization produces more abundant and healthier fruit. Vine growers might take a hint from these observations, and plant a few male stocks in their vineyards, say one to forty or fifty feet of their fertile stocks, and might expect from such a course healthier fruit, which probably would resist rot and other diseases better than fruit grown in the ordinary way. I would expect such beneficial influence, especially in all varieties that have short stamens, such as the Taylor. Male stocks can be easily obtained either in the woods or from seeds. It is, of course, understood that the males ought to belong to the same species (not necessarily to the same variety), as the fertile plants of the same vineyard. European vine growers may also profit by this suggestion."

in quality to the ordinary kinds, but they have been accidentally destroyed.

Conceiving it to be important to pursue this subject even to the native homes of the wild *Viniferas*, I addressed the following letter to the Secretary of State:

SAN FRANCISCO, September 18, 1880.

Honorable W. M. Evarts, Secretary of State, Washington, D. C.:

MR. SECRETARY: The ravages of the phylloxera among the vineyards of Europe and the United States have finally brought vine growers to the necessity of seeking to discover varieties which may be proof against the attacks of the pest. So far, it is known, by experiments in France and the United States, that most, if not all of our American wild vines are endowed with constitutions which enable them to resist the parasite. It is my opinion that it will be found yet that the wild vines of Asia, from which the European vines have been taken centuries ago, are also to be relied upon. I believe that the weakness of the European vines now cultivated in this country and Europe, is due to the exhaustion of the vitality of the plant and the weakness engendered by hybridization during a long period of propagation, dating before the Christian era, during which time propagation has been operated by means of cuttings and hybrids. The law of nature, which points out the seed as the true and normal means of propagation, has been ignored. I believe if we should go back to cuttings or seeds of the original Asiatic varieties of the *vitis Vinifera* taken in the savage state, we should be able to regenerate our vineyards with healthy stocks. It is, at least, very important to ascertain whether the theory be true or false.

In the interest of viticulture, which is now becoming an industry of vast importance in the United States, a work of great value may be accomplished through your Department.

If you will devote to this industry a small part of the labors of the Diplomatic and Consular service, as you have so intelligently done in respect to other industries, we may obtain information of incalculable value. Therefore, permit me to ask that a circular letter of instructions may be dispatched by you to all the Consular officers throughout the world, and especially to those resident in Asia and southeastern Europe, calling for such information as they may be able to obtain concerning grapevines in the countries where they are:

*First*—Concerning any wild vines that may be growing there—the different varieties, characteristics of growth and fruit, and the practicability and expense of procuring cuttings and seeds for use in this country. [Our interest is particularly for this State, but the information will be gratifying to other parts of the United States.]

*Second*—Concerning varieties of vines cultivated and their original peculiar characteristics, diseases, etc. This item need not apply to France and other leading vine-growing countries where there is already sufficient published concerning them. It would be important, however, to obtain a classification of the varieties of vines of Spain, Portugal, Italy, Austria, Greece, Russia, and Asia Minor. From France and Germany we have books describing their vines, but not from the other countries in sufficient detail.

I am informed by travelers that very strange and comparatively unknown kinds of grapes appear for sale in cities of Japan, China, India, and other Asiatic places. An army officer of Great Britain observed extraordinary grapes at Cabul, coming from the Himalaya, which he believed were wild varieties.

If the Consuls could procure seeds of the varieties which are little known or unknown in the United States, from southeastern Russia, the Caucasus (whence tradition says our cultivated European vines came), Asia Minor, the Himalayas, and other strange parts, we should be glad to receive them for experimental work in this State. Sometimes they might send cuttings also, which should be packed in boxes snugly and filled with sand, or humid (not moist), sawdust. If the sawdust is too moist, the cuttings might sprout and be ruined. All seeds and cuttings should be carefully labeled and varieties described as nearly as possible, and the exact place where found preserved for future use and reference.

The seeds and cuttings of the wild vines of Asia and the southeastern part of Russia, are especially important to obtain; also, the cultivated varieties of that region.

To obtain seed, it is only necessary to crush ripe fruit without injuring the seeds, and dry in a shady and dry place. Small sacks or tarred paper will do well to send them in. The seeds need not be separated from the dried skins and pulp. It would be an advantage to have them just as they were dried, in order to study the dried skins and pulp.

It is possible that something important might be found in the southern hemisphere; hence it would be well to make such a circular general, although we look to Asia for more interesting results.

Hoping that this request will meet with your approval, I remain, most respectfully, your obedient servant,

CHAS. A. WETMORE,

Vice-President, and Chairman of Executive Committee of the State Viticultural Commission.

The following reply was received:

DEPARTMENT OF STATE,  
WASHINGTON, September 30, 1880. }

To Charles A. Wetmore, Esq., San Francisco, California:

SIR: I have to acknowledge the receipt of your letter of the 18th instant, in which you solicit the aid of the diplomatic and consular officers of the United States in obtaining for your use cuttings and seeds of wild grapevines in their respective localities, and to inform you that the department appreciates your suggestions and will issue a circular, agreeable to your request, after being informed to whom the packages should be sent, and in what manner the attendant expenses of procuration and transportation are to be provided. These expenses will, doubtless, be very considerable, and this department is not provided by Congress, or otherwise, with any appropriation from which such expenditures could be defrayed.

I am, sir, your obedient servant,

W. HUNTER, Acting Secretary.

It being now too late to procure seeds this season, and most of the regions, such as those in Kashmir, being covered with snow, I have concluded to await the Spring for further efforts. Meanwhile, a liberal minded gentleman, now engaged in viticulture, Captain Gustave Niebaum, has promised temporarily to aid in the matter so far as expenses are concerned, and until the State can attend to it for the public good. The State should establish an experimental vineyard for such purposes as these, as well as for others, where individual profit is not concerned.

Since preparing the preceding remarks, I have been presented with a small lot of seeds of two varieties of wild vines of the Kashmir Mountains, Asia, obtained by Mr. J. H. Drummond, of Glen Ellen, Sonoma County, through the assistance of a friend, an officer of the British Army. These will, I hope, furnish the nucleus of an important experimental nursery.

#### THE SEEDLING THEORY IN FRANCE.

Concerning the practicability and relative value of planting seedling vineyards, as compared with the ordinary system of propagation by cuttings, opinions are vaguely expressed. There is yet no certain evidence to sustain any well grounded theory. This field of experiment has not been systematically explored.

Admitting that the grapevine is very inconstant and produces from the seed plants of variable fruitage, and knowing well that choice hybrids and improved stocks suffer great changes and frequent deteriorations, when propagated by seeds, I have nevertheless considered it important to investigate the following problems, viz.:

*First*—Whether any varieties, valuable for wine purposes, will produce from the seed a fair proportion of fertile vines, bearing fruit of average value for wine making and in average abundance at an early age.

*Second*—Whether such varieties obtain by such propagation any increased power of resistance against phylloxera, or other diseases.

The answer to the latter question appears to be anticipated prematurely by certain French authorities, who assert that seedlings of the *vitis Vinifera* succumb to the phylloxera as readily as rooted cuttings, or layers. I think this is premature, because the field of experiment has been too limited. One theory is that the phylloxera is a natural parasite of the vine developed into epidemic character by conditions of culture favoring disease; which conditions might not have existed if vineyards had generally been planted with seedling roots. The failure of the normally healthy seedling to resist epidemic attacks is not a reason for supposing that the epidemic

would have been the same had all the vineyards been of seedling growth. However, this question is too problematical for dispute; it is open for experiment only. Nevertheless, I have considered the first question as opening a more important field, less troubled with doubtful theory. I have proved to my own satisfaction with seedlings of the *vilis Californica* that their roots were more normally developed, sounder, and suitable for sustaining plant life than the less perfect systems produced from cuttings. In this respect I look upon the seedling coming from seed of a pure unhybridized, or not exhausted (effeminate, so to speak) stock, as a plant superior in native power to a rooted cutting, whose ancestral vitality has been drawn through countless millions of cuttings from one seed planted centuries ago. Now, therefore, if it can be determined that the Zinfandel, Riesling, or other varieties, will reproduce themselves in fair average and proportion by seedlings, the infertile, or deteriorated plants of which may be grafted, I hold that a vineyard of such seedlings would be more reliable in point of general vigor, health, and vitality than the ordinary plantations, and would at least resist disease longer than others, if not entirely. Therefore, whether phylloxera-proof or not, I have felt it my duty to impress upon viticulturists the importance of experimenting with seedlings to ascertain which varieties most nearly and in greatest proportion reproduce themselves from the seed. This being known, starting points for seedling vineyards would be obtained. It is impossible to obtain anywhere at present reliable information on these points. I have, however, written to our intelligent United States Vice Consul at Bordeaux, Mr. L. A. Price, requesting him to ascertain whether any recent discoveries have been made in this direction. He has replied that most of his inquiries remain yet unanswered. The accomplished Doctor L. Micé, who is celebrated in Bordeaux for his viticultural researches, replied to him verbally that all the questions submitted could not be conscientiously answered, and in writing as follows:

[Translated.]

BORDEAUX, December 7, 1880.

Mr. L. A. Price, Vice Consul:

DEAR SIR: I promised you to reproduce in writing the information which I verbally gave you on reflections and observations concerning seedling vines, which have been made in our Society of Agriculture. I now perform the promise.

#### FIRST—SEEDLINGS OF FRENCH VINES.

The anti-phylloxerists reason as follows: "The phylloxera, like the oidium, the anthracnooze, and all the other plagues of viticulture, only attack our vines because they are enfeebled by pruning, excessive culture, and all the other agricultural methods having for their object the enormous augmentation of quantity or quality of products. Among these methods is the constant multiplication of individual plants by cuttings—by organs of vegetation. This is not the normal mode. Let us return, at least with long intervals, and for the present there is only time enough, to natural reproduction—reproduction by seeds—and we shall give back to our vineyards the rustic vigor (and in consequence thereof the resistance) which a long degeneration has caused them to lose."

Mr. Alexander Knyasoff, Professor of the School of Horticulture and Viticulture of the Crimea, who, sent to Europe by his Government, passed several months in Bordeaux in 1877, reasoned a little differently in a work written in Russian, but communicated (after translation) to our Society of Agriculture: "The *phylloxera gallicole*" (gall louse), said he, "is the phylloxera type; not being able in Europe to live on the leaves, it seeks that which is more analogous—that is to say, the rootlets, produced from the evolution of subterranean buds of our cuttings. If, instead of these rootlets, which, according to botanists, are only leaves modified by surroundings, there were formed a system of true roots—that is to say, the last ramifications of a stem produced from the growth of the embryo root germ—it would be a question of an organ

more resistant, and, being incapable of sucking its nourishing sap, it would perish of inanition. It is necessary, therefore, to regenerate our European vines by seedlings practiced during several generations and aided by a good selection, and, when vigorous plants shall have been thus produced, we may graft with the most improved stocks, to preserve to our vineyards their acquired qualities."

Two essential points of this system remain without demonstration: First, the impossibility of the *phylloxera gallicole* to live on the leaves of our European vines; second, the supposed difference of the anatomical constitution between the roots of cuttings and those of seedlings.

But let us pass theoretical consideration and observe facts. M. de Sonnevill, Vice-President of the Society of Agriculture, has produced an important seedling vineyard on his estate of Latour—Gueyrand, in the Commune of Ste. Eulalie d'Ambares—and we know with what care this expert viticulturist treats all that he does. The results obtained by him were for a long time announced to the public in a contradictory manner. M. Laliman declared them to be disastrous. M. Trimoulet said, on the contrary, that they could not be more conclusive in the point of view of increasing resistance. I profited, on the 10th of March, 1878, by the simultaneous presence of Messrs. Trimoulet, Laliman, and de Sonnevill, at a meeting where I presided, to ask of the last named to decide between the statements of the first two, and Mr. de Sonnevill then solemnly declared, that at his place, in the midst of the phylloxera, the seedlings had not shown any worse or better results than vines from cuttings, or layers. This affirmation was recorded in the report of the reunion by two Secretaries of the Society of Agriculture, to the reading of which all the interested parties were invited.

#### SECOND—SEEDLINGS OF AMERICAN VINES.

A regulation of France, with respect to phylloxera, was proclaimed in October, 1878. Our districts were divided in respect to the exchange of suspected debris of vines, as follows:

Districts very much infected; free importation, but without the right to export the debris of vines or stakes, except into districts of the same class.

Districts moderately infected; too sick to be authorized to export everywhere, but still curable, or appearing to be such, and consequently not permitted to import except from districts free from disease, or reputed such; in such districts there is liberty of exchange from one commune to the other.

Districts little infected; subjected to the same laws as the preceding class, regulated, however, by the prefect in their internal exchange from one commune to another.

Districts uninfected; authorized to export freely, but importation necessarily strictly regulated.

Our department, for example, is divided by the Garonne and the Gironde, in two parts, subjected to rules very different; all the right bank is classed under the first category, that of districts very sick, and enjoys, therefore, entire liberty of importation; but the right bank, infected in a less degree, is deprived of the right of receiving the organs (cuttings, roots, etc.), of vines subject to suspicion, such as the Barbeaux and American plants; so that the vine growers of the districts of Bazas and Lesparre, that is to say, the producers of the finest white wines in the world, and of red wines also classed among the best, cannot think of reconstituting their fine vineyards except by cultivating seedlings of American vines (the importation of seeds being permitted in all places), with the hope of grafting them in future.

But the seedling generally is uncertain, for if even the plant is known from which the seed comes, it is not known what the father was (whence came the pollen), and, the offspring having in general the qualities of both parents, a seed procured from a resistant variety may easily produce in germinating a plant less resistant, or having even lost all resistance.

Thus there is an impassable barrier for the proprietors of those unhappy districts, which are "neither flesh nor fish," which are sick, but not entirely ruined; it seems that they have only to await extreme disaster, and no one can bring aid to them until they are entirely lost.

Such was, at least, the situation two years ago. Happily, Dr. Engelmänn, a celebrated American botanist, has established the complete absence of the *vitis Labrusca* (the only American species not resistant), from the forests of the Mississippi Valley, so that the seeds gathered in that region, whether coming from pure resistant species, or from hybridization between resistant species, must consequently furnish, in either case, resistant plants. Therefore, in sending to Europe seeds of the wild vines gathered in that valley, it will be permitted to each, even in districts yet uninfected, to prepare, from necessity or precaution, good grafting stocks.

In 1880, in conformity with these principles, Dr. Engelmänn sent to M. Millardet, Professor of Botany to our Faculty of Science, seeds gathered from the *vitis Aestivalis*, *v. Cordifolia*, *v. Rupcstris*, *v. Ripara*, and the latter distributed them at a very reasonable price. I bought some of these seeds and germinated them last Spring; they have grown well, but I do not know that their roots will be resistant, having not yet, on my estate (situated at St. Pierre de Mons, Canton de Langon), discovered the presence of phylloxera. Mr. Laliman contests the fact that forms the basis of Dr. Engelmänn's theory.

Such, my dear Mr. Price, is what I have had to say, or to establish myself, concerning seedling vines, whether in the body of the Society of Agriculture of the Gironde, or of diverse phylloxera commission (or rather anti-phylloxera), where I have participated. I shall be happy if my communication may be of some use to you.

Meanwhile accept my most distinguished and devoted regards.

DR. L. MICÉ.

This valuable letter, having been obtained through the courtesy of Mr. Price for the use of this Board, I take pleasure in translating in full and literally. The extreme conservatism of the French savans respecting any innovation in the methods of agriculture, offers no proper ground for discouraging us from pursuing the investigation of seedlings. What he feared respecting the use of seeds of wild vines need not be feared by any one who knows that his seeds come from a district where the pollen of non-resisting vines may not have impregnated the flowers of resisting vines. I had this precaution in view last year when I commenced to gather seeds of the *vitis Californica*, in Lake County, at a distance from any cultivated vines. Our French friends should know also that the California wild vine is purest of the pure, having no neighboring wild vines of other species to hybridize them. We may expect through seedlings of our wild vine, to obtain plants as pure in stocks as their parents.

#### THE GALL LOUSE IN ARIZONA.

I have received a specimen of leaves of a wild vine, growing about sixty miles from Tucson, Arizona, affected by the gall louse (*pemphigus vitifoliae*), a perfect counterpart of the leaf illustrated by Professor Riley, and submitted in the report of your Phylloxera Committee. It was presented by Mr. Bell, editor of the *Merchant*, and obtained by him from Dr. Howard. This insect, claimed to be identical with the phylloxera, attacking the leaf only, appears not to have been able to live on the root; at least it is a sign of a resisting variety, or species, when it is found on the leaf. It is not found on leaves of the *viniferas* which succumb to the root-inhabiting type. In this connection, it should be said again, that all cuttings and roots of Eastern, or European vines imported, should be thoroughly disinfected, and all wrappings burned to prevent importation of disease. There is not much danger of importing the insect on cuttings, but there is some; rooted vines are especially to be feared. How to disinfect cuttings is a problem to study; but in the absence of any better recommendation, I would advise immersing the bundles, as soon as received, in a strong solution of bluestone, for a short time, after which they may be washed or soaked in pure water. This precaution would be well to adopt with all cuttings, no matter whence they come, to disinfect them of any possible insect, and more particularly fungoid germs. I think it would be better to propagate the phylloxera-proof stock, especially the pure, wild species, by means of seeds rather than by imported cuttings. I have ordered a considerable collection from Missouri and Texas for this purpose.

#### THE VINE OF SOUDAN.

Mr. Price, our intelligent Vice-Consul at Bordeaux, who has not lost the usefulness of his journalistic pen in Consular service, sends, also, an account of a conference with M. Lécart, under the auspices of the Society of Commercial Geography of Bordeaux, which took place last month. According to the *Gironde*, M. Lécart is a well known botanist, who was sent to Senegal, Africa, with a mission of the Ministry of Public Instruction, to study the vegetable wealth of the valley of the Niger. Having started from Medina, the first of last May, M. Lécart and his assistant, Mr. Durand, were to go to

Segou. They directed their course to the north, towards Kouniakary, where they learned of the revolt of the Bambaras against the Sultan Ahmadou, and a little while later, from Dr. Bayol, who had succeeded in making his escape, of the unfortunate result of the Gallieni expedition. The two botanists were compelled then to approach the French posts, and they stopped at Koudian, near King Diango, and resolved to spend the Winter profitably in studying the flora of the valleys of Bakhoy and Baffing.

In proportion as the region traversed was arid in going over it, it was, on the return trip, changed in appearance by the first rains; everywhere verdure, plants springing from the earth, and among them, in this forest of Koudian, between the twelfth and thirteenth degrees of latitude, an unknown specimen. M. Lécart devoted himself to study its development, and very soon its bloom did not permit any doubt; it was a vine springing from a bulbous root. However, he was unwilling to give to the public this strange discovery without first making sure of it, without having gathered and eaten its fruit.

Meanwhile he took notes at the peril of his life. Diango refused him nothing, except the privilege of writing. The rumor was circulated that "the French were writing about the country to come and take it forthwith." Nevertheless, it was necessary that the Ministry should be informed of the discovery, and Diango wished them to mount guard over the writing case of M. Lécart so as to review his report. But the report being finished, it was a question how to send it. The young and energetic co-laborer of M. Lécart, M. Durand, took charge of it, and succeeded in placing it in good hands.

To the flowers succeeded sweet and exquisite fruits, and after that there was no room for hesitation; the tuber was an annual vine, which, in the dry season, lost its leaves and wood to produce them anew in the rainy season. The canes, which we have seen in the herbarium of M. Lécart, have some similarity with those of our European vines, although in appearance less woody.

"This vine," M. Lécart declares, "may be acclimated everywhere, even in Siberia." As it only leaves a tuber in the soil which requires only three months of heat to produce, it will give fruit anywhere; the botanist who has lived successively in Senegal, New Caledonia, Cochinchina, etc., guarantees this. Without doubt there will be some disappointments before experience has taught the necessary methods, but this is equally true of all essays.

M. Lécart had taken plants and seeds; unfortunately the asses which carried the former were drowned in a morass, and he only saved the seeds, which in two years, he affirms, will have germinated and given fruit. We ardently hope that his belief will be realized.

M. Lécart defends himself with spirit against the charge of having desired to make money out of his discovery, as he had been reproached at the Academy of Sciences. He could not yet dispose of anything before the Ministry had passed upon his mission. However, he proved how much the notoriety of his discovery hurt his feelings, since he had given such minute details of the places of the production of the annual vine, and had named the people of the country who had aided him.

The *Gironde* says: "We regret that space and time prevent us from making a full report; but the Bulletin of the Commercial Geographical Society of Bordeaux will certainly publish a more complete study of this interesting question."

I have requested our able Representative in Congress, Honorable Horace Davis, to whom we are indebted recently for a consignment of choice vines from the Department of Agriculture, to interest the Commissioner of Agriculture in this matter, and to procure, if possible, specimens of the seeds obtained by Mr. Lécart.

#### LOCAL POINTS OF INTEREST.

During the past season I have personally studied the important vineyards in every section of this State, excepting those of El Dorado County, being thereby enabled to form comparative opinions. I am convinced that in the southern part of the State, and in the foothill regions of the Sierra Nevada, the chief defect to be remedied consists in the selection of vines. Mr. Rose has demonstrated with his *Blaue Elba* variety, that the South can produce fine light table wines. Captain Packard, at Santa Barbara, demonstrates that near the coast, beyond Point Concepcion, the vine flourishes and produces very light wines of fine character. The use of the Mission grape, except for "hot" wines and brandies, generally is a detriment to our viticultural progress. This is especially true of the El Dorado district, which is capable of producing exquisite wines, but which now retards the popularity of this industry by producing wines unfit generally for anything except dessert use. Some of our "temperance" advocates quote quite liberally the results of wine drinking in the mining counties, as arguments against the production of wine. These results will not be so apparent when wine suitable only for the liqueur glass, or the still, are less common. I have never known any one, except some of our hardy Portuguese and Italians, to drink wine habitually from the Mission grape, without complaint against its fiery effects. There are other qualities of wine besides its alcoholic strength which make it heady in certain cases. Experience shows that they exist before the chemist applies his art in analyzing them.

The distinction between the "hot" and "cold" wines should be made as soon as possible; the former should not be encouraged as habitual beverages, and the grapes that produce them should be diverted to the production of liqueur wines and brandies, rather than to imitations of clarets, hocks, and sauternes. No wine that requires alcohol to keep it, should be tolerated as a table drink; and none that produces dizziness or headache, should be even excused. The distilleries afford ample outlet for such productions. It should be remembered, however, that imperfect fermentation, together with the over-ripe condition of grapes when gathered, is often to be blamed for the injurious effects of such wines. Our Italian and Portuguese vintners are fond of such drinks, which seem to agree with them, while they are poison to the Anglo-Saxon stomach and brain. The latter must be careful to drink only dry, well fermented wine, and in certain districts, German and French methods are required before the people generally can afford to take to drinking local productions.

Two important districts, which promise to equal the best in the State, remain almost entirely neglected, viz.: the Counties of Lake and San Diego. Lake County is certainly destined to become famed for its clarets and light white wines. It is, I believe, the true "Rhine" district of California. San Diego possesses some characteristics unlike those of any other part of the State; it has the foothills of the Sierra Nevada with a seacoast climate tempered by soft breezes.



The climate of the southern counties is very much misunderstood by all who conceive that frequent failures in the cereal crops mark a place as sterile. Southern California is not as sterile and dry as the Mediterranean coast of France. While in the Departments of the Midi, in France, only the olive and the vine are very successfully cultivated, wheat and other cereals being failures and irrigation impracticable, our southern counties produce also the orange, lemon, lime, as well as fair average returns of cereals and excellent tree fruits, such as apples, pears, apricots, etc. There is no part of southern France that is so favorable for vines and olives as our southern coast. The red soils of San Diego have been demonstrated recently to be suitable to profitable culture of the vine without irrigation. The fruit is luscious, fragrant, and beautiful; lands are cheap and success is certain to those who intelligently select their vineyards and carefully cultivate them. San Diego may confidently expect to become the Marseilles of California and Los Angeles its Lyons. I feel also that it is important that special attention should be given to the region lying about the head of navigation of the Sacramento River. This, too, has been neglected, notwithstanding, as far north as Shasta, there is every reason to believe that grand results may be attained.

We may claim the privilege, by reason of our close affinity, to say something of Arizona. I have already learned enough, by studying samples of the must from the wild grapes, to predict that in the vicinity of Prescott viticulture will become profitable. This is probably true of places near Tucson. The region for the culture of the *vitis Vinifera* extends through Arizona, also into New Mexico. Our Arizona neighbors will do well to experiment carefully with the culture and improvement of their best varieties of wild vines, but they should avoid the addition of sugar to the juice, aiming by culture to ennoble the vine.

#### FERTILIZERS.

Our viticulturists are beginning to study seriously the subject of fertilizing vines. I think that it is therefore most important for them to investigate fully the relative values and defects of the different forms of manures, viz.: organic and inorganic. I believe that there are many good reasons for condemning the use of decomposing vegetable matters, and for favoring the reduction of all fertilizers to inorganic conditions before applying them to the soil. The healthy vine needs principally phosphoric acid, potash, and lime; the diseased vine, especially when attacked by phylloxera, needs also ammonia to stimulate the root and cause growth. Bones and wood ashes, reduced with sulphuric acid, will probably supply the best stimulus and plant food. The bones being crushed and acted upon by the sulphuric acid, sulphate of lime (gypsum) is formed, the phosphoric acid uniting with the potash of the ashes, forming a phosphate which is readily taken up by the plant.

I think that we have much to dread continuously from the various forms of fungus, and should avoid harboring the germs among the vines in any way. Decaying vegetable matter must favor fungoid developments; and I would advise annual cleaning of the vineyards—debris of leaves and canes being carefully raked together and burned. Where mildew, or other fungoid disease has appeared, I

would, after pruning, scrape the bark and wash the vines with a strong solution of bluestone; the dead leaves and waste prunings being burned, this method would nearly, if not quite, eradicate the germs of disease. By using only inorganic, or chemical manures, the soil and vines may be kept clean. The following extract from a letter to the *Healdsburg Enterprise*, published this year, corroborates these opinions in some respects:

My vineyard near Healdsburg is an old one, most of the vines being from twelve to sixteen years old. It has never had an ounce of manure of any kind on it since the vines were planted, until last year, and then only a few vines have been experimented on. It lies on a gentle slope to the south, and a small portion on an abrupt rise facing the south; there is a very great difference in the flavor of the grapes in the lower and upper portions. A few vines from each portion were selected and manured as follows: The first with barnyard manure, well rotted; the second with dead chickens from my yard; the third with ashes; the fourth with bones; the fifth with a mixture of bones and ashes; the sixth with chip manure from wood pile, well decomposed. It is impossible to give an estimate of the full effect of these measures yet, but this year, *i. e.*, the year the manure was applied, the result was as follows: The vines manured with barnyard manure looked well, and the growth of cane is large. The grapes, however, did not correspond, and every vine so manured mildewed. Those with animal manure, *i. e.*, the dead chickens around them, are in better condition, but the yield does not attract attention. The ashes and bones each have given strong canes, a good yield of grapes, and the vines are very healthy. Combined they have an extraordinary effect—the vines are loaded. The chip manure has acted well, but not equal to either bones or ashes, singly or combined. One vine, manured with suds from the wash-tub, yields well, but the leaves look sickly and white.

#### QUARANTINE REGULATIONS.

This Board, in my opinion, cannot impress upon the State with too much earnestness the immediate importance of quarantine rules and regulations to govern:

*First*—The introduction of new vines and cuttings into the State from Eastern States, Europe, or elsewhere.

*Second*—The distribution of cuttings and vines from one place to another within the State.

*Third*—The disposition of fruit boxes and other things connected with the vineyards liable to carry infection of disease.

The disinfection of *all* cuttings, boxes, etc., ought to be made compulsory by law. We are in especial danger, now that importations of Missouri and Texas vines are becoming common.

There should be appointed competent officers to regulate and enforce such quarantine rules as may become necessary from time to time. To such work should be added that of eradicating disease; whether this should be done under one general State management, or whether a law may be constitutionally passed authorizing local district organizations to defend themselves against invasion of disease and to eradicate it when found, I am unprepared to say. One thing, however, is certain, that the State cannot afford to delay taking action to prevent the spread of disease, while the means of eradicating it are still being studied. The Government of the United States may be appealed to for aid; ten per cent. of the collections of internal revenue received from the sale of brandy stamps, would, if expended judiciously, in a short time, completely eradicate the phylloxera, provided the introduction of new germs were prevented by quarantine rules. Nothing, however, could be more unjust than to punish those whose vineyards are infected, with the entire burden of disinfecting the State. The cost of suppressing a plague, threatening human life, is taxed upon all, because all are interested in self-protection; the same principle should apply to vineyards, orchards, etc.;

the difficulty is in devising the form of legislation necessary, so that the costs may be equitably assessed and collected. A liberal appropriation by Congress of part of the internal revenues collected from brandies in this State to be used in preserving its sources of revenue, would relieve the question of much of its difficulty, provided the State will create officers to do the work and give them power to act and enforce strict laws.

#### WINE AS RAW MATERIAL.

Concerning the wines produced in our vineyards, generally speaking, they can only be considered as raw material for the large dealers to work over in blending vats. Only a few produce wines of much value to consumers or retailers. This is not so true of white as of red wines. California producers cannot expect to obtain much individual celebrity for their claret and burgundy types, until they have assorted their vines of proper varieties in just proportions, so as to accomplish, when they rack their musts from the fermenting tanks, or pipes, what they now leave for the dealer to do. None of the celebrated French wines are the products of single varieties of grapes. Knowing in what proportions the musts of different grapes must be blended to produce perfect and agreeable wines—aroma, bouquet, color, strength, acidity, smoothness, freshness, etc., all being considered—the French vine grower cultivates all varieties in the proportions required. Generally the different varieties ripen at different times and must be fermented separately; but they are racked off together and left to go through the after fermentation in close union, thereby perfecting the blends.

It is true that it has been better to keep the wines of the different grapes separate at the vineyards in this State, because the varieties cultivated ought not to be mixed, or are not in right proportions. The fine art of blending must be studied by the producer, if he expects ever to achieve distinction for his products. I have advised certain people in San Diego County, to try the combination of two fifths Zinfandel, two fifths Charbono, and one fifth Grenache. Mataro and Carignane have also been suggested to take the place of part of the Charbono and Zinfandel. Great finesse can be acquired only by long experience; the cellar-master of the large dealer, who handles raw material from all parts, will be able to give sound advice as to the selection of varieties and their proportions in given districts.

I have also called the attention of southern growers to the lack of California wines of the Sauterne type. We have succeeded in reproducing the Rhenish type with the Rieslings, Burger, and Blaue Elba; the Chablis with the Gray Pinot; but only one vineyard yet produces the Sauterne. The varieties necessary for the Sauterne must be sought for among the characteristic vines of the white wine district, near Bordeaux, chief among which are the Sauvignon (*verte* and *blanche*). Moreover, inasmuch as experience in Europe shows that the aromatic Rieslings lose their virtues in southern latitudes, while the Sauvignon flourishes in the south of France, we may expect better results with the latter blended with neutral Burgers and other appropriate white wine grapes in our southern counties than with Riesling. The market, moreover, requires Sauternes as well as Rhine wines.

The market for our fine Zinfandel, in places where the taste is cul-

tivated for French claret and Burgundy types, would no doubt be increased by a judicious blend with favorite French varieties, such as Charbono, Grenache, and Mataro, which, while not the finest of French grapes, are leading stocks for esteemed wines and are good bearers. The shy bearers, which produce grand French wines, may be experimented with at leisure after the market for ordinary table wine has been satisfactorily supplied.

#### CLASSIFICATION OF CALIFORNIA WINES.

It is impossible yet to make a fair classification of California wines; in the best districts varieties of vines are still cultivated which deteriorate the quality of their characteristic products; in few vineyards are there any carefully selected proportions of different varieties suitable to be blended after racking from the fermenting tanks; and in most places, it may be fairly said that the cultivation of the best varieties suited to climate and soil has scarcely been begun. Few vineyards are therefore capable of turning out completely blended and perfect wines. The scarcity of choice cuttings has frequently compelled the vigneron to plant whatever could be found most conveniently; much, however, is to be blamed to the lack of enterprise in procuring at some expense from Europe the requisite varieties. The collection made by Colonel Agoston Haraszthy has not been preserved; the names of varieties have been confounded in many cases; and there is now a pressing need of a new and complete collection.

In respect to varieties of Rhine wine grapes our State is best supplied. Our Rieslings, Gutedel (Golden Chasselas), Blaue Elba, Traminer, and Burger have won the first place for our white wines, because:

*First*—We have complete selections for judicious blends.

*Second*—These varieties have fortunately been planted where they are best suited in climate (with few exceptions), viz.: on the northern limit of viticulture.

In respect to Sauterne varieties, we have only one fine collection, and that is incomplete, viz.: at the vineyard of Charles Lefranc, in Santa Clara County. He has, however, the genuine Sauvignon *verte* and *jaune*, which imparts the characteristic aroma of the Sauterne wines. I think that in the coast counties south of the Bay of San Francisco this variety should be largely cultivated, viz.: about one third of each white wine vineyard should be of this stock, the balance (in the absence of Semillon, Chalosse, Muscadelle, etc.) being made up in due proportions of Blaue Elba, Golden Chasselas, and Burger.

In clarets we are notably deficient, notwithstanding the glory of our Zinfandel. The Zinfandel is not a French wine grape, and fails to fill a certain market demand, and in many cases wants some companion in the fermenting rooms. The mixture of the Zinfandel (Hungarian) with Malvoisie (a port wine grape), which is so much practiced in Napa County, ought to be discontinued, as soon as other varieties of finer quality can be substituted for the Malvoisie. I have yet failed to find good reasons, excepting the scarcity and high price of cuttings, for the neglect to sufficiently cultivate in all the Sonoma and Napa vineyards, which can nearest approach the Bordeaux, the varieties which give character to the finest Bordeaux red wines. The Carbenet Sauvignon and the Malbec have been too long ignored.

We have no Burgundy plantations. It is too commonly the custom to call all heavy clarets Burgundies. The true Burgundy is the product chiefly of the Pinot family of grapes, just as the Rhine wine owes its reputation to Riesling, and Sauterne to the Sauvignon. In Santa Clara County is found a vineyard succeeding in reproducing the Sauterne type; but many places falsely naming their products Burgundy. The Charbono, Trousseau, Grenache, Carignane, and Mataro are not Burgundy grapes. The only true Burgundy grape in that district is one that is misnamed a Riesling, viz.: the Pinot Gris, called generally "Gray Riesling." The Charbono and Trousseau are leading varieties from the Jura District of France, the wine of which ranks nearly with but inferior to Burgundy. They need, however, the Poulsart to complete their blend. The Grenache, Carignane, and Mataro are the leading varieties of the Roussillon District, in the south of France, at the foot of the Pyrenees. They produce wines here of great value, as they do in France, where they form the foundation of wines of exportation. They should be largely cultivated in our southern counties.

It should be admitted, however, that, as Sonoma and Napa Counties have the best collection of German grapes, and the largest plantations of Zinfandel (Hungarian), Santa Clara takes the lead in French varieties, which, however, are not in sufficient quantity to satisfy the market. Mr. Lefranc has, also, the only considerable plantation of Carbenet, which ought to be propagated in place of Malvoisie in Napa and Sonoma, with Malbec and Zinfandel; Charbono, Mataro, and Zinfandel will also be fine for those two counties. The Mataro is there misnamed the "Upright Burgundy."

In sherries we are also deficient. We have no plantations of true sherry grapes, unless the Mission is one, as some suppose. In our southern counties, the Sacramento and San Joaquin Valleys, true port and sherry producing varieties should be propagated. There is too much carelessness and false economy in selecting varieties when planting. Generally the "fever" strikes the farmer about January and too late to make proper selections, often he is too careless to make at least a small start with proper selections, from which he may propagate cuttings hereafter.

These remarks pertain to types of wine resembling, by reason of the characteristic aromas and flavors, those of celebrated European districts, which can only be reproduced by selecting the proper variety and climate adapted to it. I believe, however, that important modifications, caused by peculiarities of soil and climate, and the cultivation of varieties in unaccustomed conditions, will be discovered, that will eventually result in peculiar California wines of great merit. This we may expect, especially from the El Dorado District, or Sierra Nevada foothills, portions of the Sacramento and San Joaquin Valley, and such southern counties as San Diego. Thus far, however, all our wines that have made reputation for us, have done so by reason of their similarity with European wines, which has generally been due to the proper selection of varieties. The Zinfandel is the only notable exception; although Hungarian, it is more known now in America than in Europe, and is the beginning of a new type of which we may be proud.

Many of the varieties we need are now being cultivated in small lots in the State; more attention should be paid to propagating them in the right places. It is folly to think that good table wines cannot

be made south as well as north; but it is equal folly to expect one variety of grape to do it all. Good clarets are made in parts of Spain as well as in France. Dry sherries, as light as Rhine wine, are made in Spain; samples of such, Manzanillas, are in San Francisco now.

NOTE.—Since the foregoing was prepared, I have found two small plantations in Santa Cruz County of Pinots, but whether they are the true Pinot Noir and Pinot Gris, of the Cote d'Or (Burgundy), or are the Chareute Noir and Gris of the Chareute (synonym Pinot de Poitou), I am yet in doubt. The wine produced from them, however, is of true Burgundy type. Some small plantations are claimed for Santa Clara and San Mateo Counties. It is true, nevertheless, that there are no Burgundy plantations of sufficient importance to affect materially our stock of fine wines. The Santa Cruz Pinots are being propagated this year in Alameda, Sonoma, Napa, and Santa Clara Counties, and have been recommended for Lake County.

In ports, it is folly to think that we must only imitate the cargo wine of Cette and Oporto. Why can we not enjoy port by the bottle as well as the glass? It is only the barbarous mixture of half fermented must, syrup, and corn spirits, which most physicians ignorantly recommend to feeble patients under the name of port, that has heretofore been imitated here for drug shop and barroom sale in any considerable degree. We can produce delicious dry ports, as well as wholesome clarets, and as innocent; we do produce them in small lots in one hot valley, but the trade has no demand yet for such superior wines—only for drug shop mixtures.

One of the curiosities of the year is the Seedless Sultana wine—a small lot fermented as an experiment by Mr. Blowers. The result has verified the predictions of its friends. This variety, besides being so valuable for raisin making, will be a leading wine grape.

A brief discussion of these topics serves to demonstrate incidentally the great necessity of an experimental vineyard, where all varieties of vines may be propagated and experimented with for the public benefit by the State.

#### COLOR IN WINE.

Experience has proved that red wines—dry and sound—are the best for regular consumption; this has created for them a popularity which has produced an attendant evil in France. Most of the deleterious adulterations are practiced in coloring wines, to cover mixtures of white with red, or water, or to bring up the standard of light color.

It is fortunate for the American drinker that he has not yet learned to be foolishly fastidious on the point of the shade of color. Vintages vary from year to year in depth of color; but consumers should know this and not make foolish objections, which tempt the dealer to correct such defects as may appear by the addition of chemicals. Wine producers in the country are always trembling, when the wine dealer comes along, lest he should complain because "the color is too light," as it generally is in the vintage of 1880. I have taken pains to ascertain whether there are any just grounds for the common practice of reducing the price a cent or two a gallon because the color is a trifle light. I do not find consumers at the private table complaining about color. Experienced dealers tell me that the only complaints come from retailers, such as French restaurateurs and small dealers, who buy by the cask and sell by the gallon. They complain, if the color is not dense, because it is their practice to water the wine to make it taste like French *vin ordinaire*, and to enable them to sell cheaply, and if the wine is light in color their

practice will be betrayed. Hence the temptation to artificially color wine is felt. The public should learn to buy their wines at fair living rates and do their own watering, or if served with cheap wine, not to complain of lack of color.

Whenever the great dealers complain at the vineyard about light color, it is either an excuse to demand a lower price, or in the interest of peddling wine sellers, who water their wine as others water milk (in the one case making use of red dyes and in the other of chalk, or magnesia); for their legitimate consumers do not trouble themselves much about it.

There are valuable grapes which give deep color, such as the Charbono, but that is not their chief value, except to the small dealer, who waters his wine.

#### FRENCH WINE IMPORTATIONS.

The increased importations of wine into France tell terribly the story of the havoc that has been created by the phylloxera. Mr. Price sends me the following statement of importations at Bordeaux during 1879 and 1880:

##### EIGHTEEN HUNDRED AND SEVENTY-NINE.

From Spain .....	27,378,707 litres.
From Portugal .....	149,507 litres.
From Austria .....	32,290 litres.
From Italy .....	40,565 litres.
From Ottoman Empire .....	2,642 litres.
Total (in litres) .....	27,603,711
Equal to 7,287,376 American wine gallons.	

##### FIRST NINE MONTHS OF EIGHTEEN HUNDRED AND EIGHTY.

From Spain .....	51,641,096 litres.
From Portugal .....	1,087,764 litres.
From Italy .....	1,408,490 litres.
From Austria .....	512,640 litres.
From Turkey .....	856,861 litres.
Total (in litres) .....	55,506,851
Equal to 14,652,000 American wine gallons.	

This shows a remarkable increase for 1880 for the single port of Bordeaux, and also the basis out of which the "Bordeaux" wines for exportation are prepared.

#### A REFORM STEP.

Owing to the curiosity excited during the inception of wine making by the novelty of wine cellars, and due to the hospitable character of our people as well as their pride in new enterprises, the habit of using wine cellars for the entertainment of guests became, unfortunately, too common. It is beginning to become well known, however, that it is "unprofessional" to "treat" in a wine cellar. Those who visit it have properly only one object in view—the study of the business and its products. Neither of these objects can be accomplished while wine drinking, and guests ought to remember that they never can offend a good cellar-master by declining to *drink* the wine which he offers them to *taste*. If any one desires to drink

wine, or any host desires to entertain friends, the lunch or dinner table is the place for indulging while eating. The man who visits a wine cellar to *drink* wine, proves by his actions, that he knows nothing of his opportunity for study; and the host, who insists on his drinking, makes himself liable to the suspicion that his wines will not stand critical tasting. In a few places, wine cellars are partially converted into retail saloons, frequented by the multitude; nothing can be more injurious to the best interests of the viticulturists than this practice of encouraging wine tippling. It should be discouraged in every way. The place for wine is on the table at meals; the doors of the wine cellar should be kept closed to keep the wine in good condition for the table. The cellar-master should have more important duties to perform than bar-tending.

When wine cellars cease to be novelties and professional pride increases with cellar masters, these evils, which cause nearly all the complaints against wine making, will disappear. It will be a good time then for the good natured proprietor, who now too often drinks his own wine in keeping company with his visitors, at times when his stomach rebels against the practice.

#### THE WORST ENEMIES OF CALIFORNIA WINES.

I find that of all the inquiring world, those who take the least interest in discovering and making known the excellences of our best vintages are American hotel keepers, restaurateurs, and other retailers of "fine wines and liquors." During the past Summer I have met, visiting this State for the purpose of investigating and reporting on the merits of our viticulture, Professor de Savignon and Mons. de Lacretelle, representing the French Government, Mr. John Clay, representing the British Government, Mr. Foster, of London, whose vineyards are in the Duro, Portugal, Mr. Nedecsky, proprietor of a great vineyard in Hungary, and a gentleman, whose name I have unfortunately forgotten, correspondent of Herr Babo's celebrated Weinlaube of Germany. All of these gentlemen came here, previously convinced that good wines were being produced in California, with the promise of grand vintages in future. I have seen four orders from leading London wine houses, addressed to their agents in San Francisco, inquiring concerning the practicability of importing our best wines to England. With very few exceptions, however, could any of these gentlemen, or their representatives, obtain any reliable information concerning native wines at hotels, restaurants, or other places of entertainment, where the best collections of beverages are pretended to be kept and honestly labeled. Mr. Nedecsky's first experience in New York, as he related it to me, was only a sample of the experience generally of all travelers. He asked for a bottle of good American wine. The answer was, "We never keep American wine; there is none fit to drink." Each of the visitors named, however, assured me that they found, after being piloted by a guide in this State, that we were producing many wines not only "fit to be drank," but fit for any gentleman's table in England or Europe. Others, who have not investigated so closely as they have done, have failed to discover the true reasons for the apparent prejudice of retailers against American brands.

The State of California exports to the Atlantic coast as much wine as is imported into the whole country from France, and consumes



herself, of native production, three fourths as much as is imported into the entire United States from all countries. Somewhere this wine is drank; where is the trifling importation of French wines drank in this State? Of course the people know all about false labels by this time.

The County of Napa produces as much wine, and good wine too, as is imported into the United States from France; yet recently I was told at the Palace Hotel, in Napa City, that they had no California wines, and I was offered a spurious imitation of Chateau Margaux, when I called for Zinfandel. I had the same experience in Petaluma at a leading hotel, in another of our leading wine districts. A few days ago, I asked at a city restaurant: "Have you any California claret?" "Yes," said the waiter frankly, "but under French labels."

There are several reasons for this American hostility to American brands:

*First*—The consumer, either from snobbishness, preferring anything foreign to anything American, or ignorant, because his wine-drinking has been confined to public hostelrys, where he has been taught to believe that all the good wine and brandy is foreign, does not insist upon being served with good native wine.

*Second*—Because the usual practice of demanding high prices for cheap wines, covered with celebrated foreign labels, which returns so much ill-merited profit, could not be maintained by the hotel-keeper, or restaurateur, if he professed to furnish native wines, which are known to be cheap.

*Third*—Because encouraging the free use of good cheap wine at the table would materially reduce the profits of the barroom, which is an important adjunct of nearly every hotel, and of the cocktails and toddies served at small restaurant counters.

*Fourth*—Because few even of the hotel-keepers, restaurateurs, and saloon-keepers have any true knowledge of the best California vintages, and take little pains to learn, preferring with stolid stubbornness and pretense of being "posted," to pay importers' prices to jobbers and traveling agents for supposed foreign wines and brandies, rather than to purchase the same goods as native productions, at reasonable rates. Few of such retailers are willing to trust their own palates in selecting wines, but rely upon foreign names and high prices to insure them the "fine wines and liquors" which they advertise to sell.

The consumer may overcome his snobbishness and ignorance and learn to know a good wine without a label, and a poor wine with one; the retailer may also, in time, if he does not drink too much whisky, learn how not to be imposed upon, and how not to impose upon himself; but the selfish interest of those who try to maintain fancy prices by means of false labels, or the profits of the barroom by keeping wine too expensive for table use, must be overcome by either the active complaint and rebellion of their customers, or the active competition of honestly-dealing retailers.

Wine drinkers—those who prefer to use wine in preference to other table drinks, and to avoid cocktails as appetizers and punches as digesters—have good reason to complain at any hotel in this State if they are not treated as fairly as the coffee or tea drinkers. A pint of good wine can be furnished at any restaurant, with profit, at the price of a cup of coffee or tea—twelve and a half cents; and at the

hotel, without extra charge, to those who prefer wine to other drinks. The people should know that the trade price of good ordinary clarets and white wines, at which hotels can be furnished, is from forty to sixty cents per gallon—ten "pint" bottles to the gallon, at from four to six cents each. Bottles are only a first cost, because they are refilled from the cask, and the cost and labor of serving wine is not as great as that of attending to the coffee and teapots, milk cans, cups, sugar-bowls, spoons, and goblets. A pint of claret may be served at the price of a cocktail, the cocktail dispensed with, and the barroom converted into a café. There is nothing wanting, except determination on the part of consumers to insist on fair treatment, to effect a great social reform, and discrimination that will compel poor wines, of which there are many, especially those of the Mission grape, to be sent to the distillers.

### THE TEMPERANCE QUESTION.

I had intended to prepare a report upon wine producing and drinking in its relations to temperance, for which I have collected valuable statistics and testimony; but I have already passed beyond the proper limits for this report. Permit me, however, to briefly state a few important points, which will be discussed in future.

The able researches of Dr. Lunier, Secretary of the Société Française de Tempérance, inspector of the insane asylums, and of the sanitary conditions of the prisons of France, has shown that the ratio of percentages of disease, crime, and casualty, attributable to alcoholic excesses, decreases in proportion as in each district the consumption of wine and beer increase; that in proportion as the supply of wine, or beer, is cheaper and greater, their consumption is greater and that of spirits is less; that the evils of intemperance are worse in the districts where wine and beer are scarce (as in Normandy, and in northern central departments), and spirits from beet roots, potatoes, and grain (whiskies) are used; that in the brandy producing districts, such as Cognac, where every vine grower is a distiller, and towns are filled with workmen engaged in preparing and packing brandies, the evils of intemperance are as small as in the greater wine producing districts; that fermented drinks, containing no distilled spirits, exert different effects in respect to alcohol contained than diluted spirits of equal strength; that red wines are preferable to white; that cider stimulates the consumption of spirits; and that natural wine and beer cure the thirst for spirits, instead of exciting it. The French Temperance Society makes these important distinctions:

*First*—There is a difference between spirits, and especially between good spirits and bad spirits.

*Second*—There is a difference in the alcoholic nature of fermented liquids and distillations.

They aim to repress entirely the circulation and sale of bad spirits—discovering their characteristics and modes of detecting them, and formulating laws to restrain the mixture of distilled spirits with wines beyond the degree necessary to keep weak vintages, checking promiscuous tipping in spirits, punishing adulterations of wines, beers, etc., and furnishing information to lead to the detection of frauds, and encouraging the use of pure cheap wine, beer, tea, and coffee, as the best means of curing public thirst for distilled alcohol. The French Temperance Society receives the hearty support of all the leading

scientists, legislators, and the intelligent consumers of good food and drink. Such a society in America, if organized, would receive similar support from all intelligent citizens of our country. The reports of the French Society, organized in 1873, contain nearly all that can be found of practical value to a student of these questions; science has been stimulated by coöperation and the good will of lovers of good wine and prudent consumers of pure brandy.

If our legislators would first put a heavy hand, aided by science, upon all adulterations and false brands, then put brakes upon the licenses to retail spirits and alcoholized wines, encourage viticulture, remove oppressive laws which prevent distillers from maturing their products, limit the number of licenses to retail spirits, so that retailers may not plead too much competition as an excuse for selling poor liquors, supervise and inspect the cellars of all retailers, where the consumer cannot protect himself from imposition, and provide ample scientific instruction, so that our people may learn to know the differences between good wines and bad wines, good spirits and bad spirits, the people, I think, will not be in danger from intemperance.

Respectfully submitted.

CHAS. A. WETMORE,  
Commissioner for the State at large.

# REPORT OF MR. CHARLES KRUG,

COMMISSIONER FOR NAPA DISTRICT.

NAPA VITICULTURAL DISTRICT,  
ST. HELENA, December 27, 1880. }

*To the Board of State Viticultural Commissioners:*

GENTLEMEN: In submitting my report, as Commissioner for the Napa Viticultural District, comprising the Counties of Napa, Solano, and Contra Costa, I must state that a protracted illness has prevented me from paying proper attention to its preparation.

*Napa County.*—The vintage of 1880 resulted as follows: Wine produced, two million four hundred and sixty thousand gallons; brandy produced, sixty thousand gallons.

The number of acres of bearing vines is estimated at three thousand four hundred; grapes shipped to San Francisco and the Eastern States, for table fruit, three hundred and fifty tons; grapes produced in the county, eighteen thousand two hundred and forty-six tons, or thirty-six thousand two hundred and fifty thousand pounds.

In 1870, according to the County Assessor's statement, there were produced: Wine, two hundred and ninety-seven thousand and seventy gallons; brandy, three thousand nine hundred and ninety gallons. In 1875, according to statements from Assessor's office: Wine, seven hundred and sixteen thousand one hundred and eighty-nine gallons; brandy, twelve thousand five hundred gallons.

*Solano County.*—Vintage of 1880 (approximately): Wine, one hundred and sixty thousand gallons; brandy, three thousand gallons.

A very large proportion of grapes of Solano County are shipped for table use to San Francisco and the Eastern States.

*Contra Costa County.*—No reliable returns have yet been received. I am informed that about twenty-five thousand gallons were made, and no brandy, in 1880.

## MEETING OF THE NAPA VITICULTURAL DISTRICT.

The annual meeting of the district was called, to be held at St. Helena, Saturday, December 18th, last. It was well attended by viticulturists of this and other districts. The able address of Professor E. W. Hilgard, delivered at the meeting, is appended to this report.

## PRECAUTIONS AGAINST DISEASES.

In regard to the ravages of the phylloxera in this district, I refer to the exhaustive report of your Committee on Phylloxera, Vine Pests, and Diseases of the Vine. It may be interesting to mention here that the St. Helena Wine Growers' Association is determined to cause the organization of all the grape growers in the St. Helena District, for the purpose of exterminating the threatened pest, wherever

it may make its appearance among them, viz.: by prompt and vigorous applications of the bi-sulphide of carbon, or any other remedy that may be known as efficacious. Quite a number of plantations of Missouri and Texas phylloxera-proof vines, will be made the coming Spring; and also, of roots raised from the seed of the *vitis Californica*.

#### RECOMMENDATIONS.

I respectfully recommend that this Board should request the present Legislature to pass a law prohibiting the use of glucose (grape sugar manufactured from potatoes, corn, or other starchy substances) in the manufacture of wines and brandies, or to compel all parties using the same to designate to the public that their products are not from the pure juice of the grape.

I recommend, also, that all interested in grape growing in their respective districts should organize clubs, or associations, with the object of enlightening their members and the public in all matters pertaining to viticulture and viniculture. The benefits derived from such associations are clearly stated in an address to the vine growers and wine makers of the St. Helena District, viz.:

"The vast amount of good the St. Helena Viticultural Association has done during the few years of its existence, cannot be doubted. It has, by publication of its minutes and deliberations, spread a great amount of information among the grape growers and wine men of this county and State.

"It has drawn the attention of many persons looking out for vineyard land to this section, caused them to buy and settle among us, and to assist the building up of our county.

"It has lent its help and applied its influence to frustrate the immense exertions the French emissary, Leon Chotteau, made in Congress to change the specific duty of forty cents per gallon on wine, to twenty-five cents ad valorem. If he had succeeded, our grapes would not bring more than ten dollars per ton.

"It has started an organization to keep the pernicious phylloxera from our beautiful vineyards, and you are well aware one man alone can do nothing in this line; only united action by all can ward off the dreaded calamity.

"It intends to secure great benefits to this neighborhood by collecting and publishing valuable statistics showing the superiority of our climate, the great fertility of our soil, the energy of those who are engaged in viticulture, the great demand for our cuttings, and many other points well adapted to attract culture and wealth to our district.

"Its intimate connection with the State Viticultural Commission, offers us ample opportunity, with a very small outlay, to have our soils and products analyzed, lectures given on important subjects connected with our interests, such as manuring, etc.

"It will import, or cause to be imported, phylloxera-proof cuttings from best sources of the Mississippi Valley and elsewhere. In short, our association has done a great amount of good, and, properly conducted, will do much more in future for our district and wine interests, just in the proportion as we enable it by our support financially and personally to do so."

Respectfully submitted.

CHAS. KRUG,  
Commissioner for the Napa District.

## THE PERMANENT MAINTENANCE OF OUR VINEYARDS.

[Address delivered by Professor E. W. Hilgard, of the State University, at a meeting of the Napa Viticultural District, held at St. Helena, December 8th, 1880, called by Charles Krug, Commissioner for the district.]

The first condition of the permanency of an industry is that it must be profitable. If not profitable, it will not be maintained. Heretofore there has been a great deal of loss in the viticultural industry. Why is this, and how can our vineyards be made most profitable?

I come before you to-day to consider the conditions of the establishment of the vine-growing interest upon a permanent basis—such a one as will not only enable us to produce grapes and make wine in a general way, and for the time being, but will serve our children as well as ourselves. It is the privilege of California to be the farthest of the far west—the point beyond which you need not seek—the *ne plus ultra*, in short, in the most literal sense. We are not mere sojourners—we have a goodly land, and we mean to stay.

But this imposes on us a duty, also; a duty to our children, and to those who will hereafter come to seek this land; a duty but too often shirked by those who are among the first to conquer a new soil; I mean that of working and building not only for the present, but also for the future. It would be easy to prove this position from a high moral standpoint. But I must admit that in many places where I have heretofore tried this line of argument upon the hardy pioneer, the destroyer of the forests, and the despoiler of the soil, I have not met with very marked success. Why should he who would constitutionally rather move than not once in five or six years, care whether he spoils the soil and the climate for those who come after him? Not expecting to have any use for permanent improvements, he does not even care to hear about them, except in so far as they might help him to make a better sale when he next moves west.

In addressing the vine growers of Napa Valley, I speak on the presumption that they do not mean to move west, or in any other direction, if they can help it. Some years ago, there were many who, in the dark hour of the industry, thought they would either have to go or change their crop. It was the time when the most profitable way of harvesting the grape crop was to turn in the hogs, while the wines of the previous years were a drug in the market and a heaviness in the hands of the dealers. That time has happily gone by, never to return, unless by our own most grievous fault. The turning point of the tide was at the time when the havoc carried by the phylloxera into the European vineyard created a panic as to future supplies, so that those who had thus far turned up their noses at the nameless and fameless American wines, were led to reflect, and at least try what could be made out of the promiscuous material, in case there should be no other available source. The fact that California is the only State of the Union where the European grape is successfully cultivated, naturally led to a closer and more serious consideration of her wine product, as not bearing with it the "offensive" odor of the

native American varieties, and being, therefore, better fitted for transformation into the "old familiar faces" of the standard brands by a little judicious blending, filling into regulation packages, and the liberal use of pretty labels and plenty of tin foil.

But is there any good reason why California wines should play second fiddle, and continue to be sold under foreign labels? I think you all believe there is none, and I feel sure of it. It is to consider how best to place this important industry upon a permanent and definite footing, how to render it self-respecting, and able to show its own face in the best company without being abashed, that we have met together to-day.

For the grape grower, unlike the backwoodsman, plants his vines not for one, nor for five or six seasons, but for a lifetime, and expects to transmit it to his children, or heirs, or purchaser, if needs be, in the best possible condition. He is essentially conservative, and builds, unlike most Californians, structures of solid rock, or hews out cave-cellars into the mountain side. Surely, an industry requiring so many costly and permanent appliances should rest also on firmest and best defined commercial and technical basis. Above all, it must stand at once face to face with that bugbear of American pioneer farmers—the use of manure, and with such refinements of agriculture as clean and thorough tillage, underdraining, and other "fancy doings," which the average western farmer declares are "too much trouble, and will never pay." How it pays to lose a vineyard, your neighbors of Sonoma can best tell you. But apart from the phylloxera, you may lose your vineyard in a variety of ways: There are other insects and diseases that, if allowed to progress unchecked, may render it unprofitable, if they do not kill the vines. Above all things, the vineyard, after feeding you for a number of years, varying according to the quality of your soil, will assuredly be starved out, unless some return is made to the soil.

What should that return be, and how shall it be made most cheaply? I hope to be able to tell you that a little better a year hence than I can now. I have only lately had an opportunity to examine your soils, and as yet no analysis of them has been made. That will be done when we get over the busy season of the vintage, and the care of the wines and their products. And that leads me to tell you, first of all, what we are doing, and intend to do, at the University, in the cause of your industry, and for what reasons. That will lead me directly to the points I mean to bring before you in this lecture.

Where does the shoe pinch? Why are California wines, as I have said and as you all know, sold under foreign labels after two trips across the Atlantic, or even perhaps only across the bay? Are they naturally inferior from the nature of the soil and climate, or if not, wherein is our system of making, treating, and marketing wines in fault?

As to natural inferiority, where should it lie? Have we not in abundance all that the European vintner anxiously wishes for—a long season, a high Summer temperature, no end of sunshine, and right here, the old lava flows of your Mount Saint Helena, forming the highest class of vineyard soils—the volcanic? Do we not cultivate successfully, and to as great perfection as anywhere in the old world, every kind of grape thus far brought to California, from the

old European stock to the latest evolved hybrids of the American vines?

And, you will probably add, do we not harvest ten and thirteen tons of grapes that in the old country would be thought doing well if they brought two fifths of that amount. We do; but I apprehend that this high production is just one of the points where our advantage is not unalloyed. European vintners have long ago found out that there is an inverse ratio between quality and quantity; and they forecast and regulate with great precision for each vineyard, the degree to which the quantity may profitably be increased; that is, without detracting too much from the quality. The reason why some of the first-class wines are so scarce in the market, is, to a considerable extent, owing to the fact that these highest qualities are produced only by a great sacrifice in quantity, and that comparatively few are willing to pay for such wine the price required to assure a profit to the producer.

For instance, the soils on which the "grand vins" of Medoc and Burgundy are grown, yield, without manure, about one hundred and thirty-seven gallons of wine—say about one ton of grapes. This, at any price that can be obtained for the product, would not pay expenses. The yield is therefore increased by the aid of manures to from one hundred and ninety to two hundred and thirty gallons per acre. What do our thirteen ton per acre men say to this?

The first thing to be said, assuredly, is that we have been working upon altogether a different basis from our European competitors in the world's market; and as the world is accustomed to their wares, it is no wonder that ours have not been favorably received at first. How many are there here present who have paid any attention to the segregation of the products of their best vineyard soils, from the inferior growths? About the only difference universally made has been with regard to the grape varieties. Wine makers have paid for Zinfandel and Riesling about twice the price that they gave for Mission. But for all that, the Mission—that most inferior of wine grapes—has retained the preponderance of numbers even to this day, in most of the wine-making districts of this State. It makes the bulk of the wine; the foreign kinds are used to impart to the Mission some kind of character, and to give the mixture the name.

This, of course, is not news to many here present; and both here and in Sonoma, the best wines have been the result of such well judged blends of musts, made prior to fermentation. But the principle should be more generally acted upon, and with a definite purpose in view, in the production of definite qualities and brands of wine, which shall be the best that can be made from given materials, and shall be able to show their well known faces year after year in the market, claiming and receiving the benefit of established reputation, not in the name of Bordeaux, Hochheim, Oporto, or Malaga, but in their own.

That I consider the first and most important matter to be attended to by the wine growers of this State. And in accordance with this view, I have arranged my plan of investigation of California grapes and soils, to be carried out by the aid of the Act passed by the last Legislature.

In order to know how to blend, you must either experiment at random, and that is a costly and lengthy process of obtaining knowledge, or else you must know the composition of each kind of



grape, and of the wine it will make by itself, with its faults and merits. This will give you at once a reliable indication of the proper blends for the production of wine of certain desired qualities, and for its treatment before and after fermentation.

This is what we are trying to do now, in the cellar and laboratory established at the University. This, the first season, we have unavoidably been late in getting to work, and our arrangements have not been as perfect as could have been wished, or as they will be the coming season—that is, provided the Legislature continues the necessary appropriation. We have found out what we must do hereafter, in order to crowd the largest possible amount of work into the vintage season, and what are the practical difficulties we will have to contend with. A detailed statement of results thus far obtained will be found in my annual report, now ready for the printer's hands. You will see that we have worked one hundred tons of grapes, making about fifteen gallons of wine of each, half white, and half red, or fermented on the skins. The several musts have been analyzed, and the wines will be at the proper time.

Of course, this investigation, applied to even the most important only of the grape varieties grown in California, is a work of no little magnitude. Not only the several varieties, but the same variety grown in several different localities, should undergo this course of investigation. It is only in recent times that such investigations have been made on a somewhat comprehensive scale, even in Europe; and it is doubtful that the grape varieties will in our climate retain the same characteristics as in Europe. At least we must determine whether or not they do so, and how far the difference goes.

But you will naturally ask, can you; can your chemicals and balances determine all these things? Well, no; not altogether. It happens, unfortunately, that the highest qualities of wines, the bouquet, the "mouthliness," escapes, as yet, the chemists' exact appreciation. But we do know, in general, as matter of experience, upon what other and more easily determined substances the acquisition of these qualities by wines depend. The European vintners made their Chateau Lafitte and Johannisberger long before chemistry was a science applied to practice. But upon the basis of their experience, we can go backward and see what is the nature of the materials and treatment that produce such results; and from a knowledge of these we can go on to judge how to produce similar results under different circumstances.

Now, I am not one of the purists who maintain that the juice of each kind of grape must be fermented and swallowed by itself, whether it brings tears to your eyes or not. The celebrated "Grueneberger," of Silesia, would be greatly benefited by a dash of Mission. In fact, judicious blending is the height of the art of wine making; for it is certainly an art, and a difficult one, to produce the best result from given materials so infinitely varied, even as regards the same grape variety in different seasons. So far, the blending has been left chiefly in the hands of the wine merchants of San Francisco. It is no reflection upon those gentlemen to say, that they have not been altogether successful in their efforts to adapt the uncertain raw wines that came to their cellars, to the established tastes of the world's market. It stands greatly to their credit that, on the whole, neutral spirits, logwood, glycerine, and sulphuric acid have played but a small role in their manipulations, and that the character of

California wines for purity, that is, for containing only the juice of the grape, has not suffered at their hands. It is true that thus far the cheapness of the native wines has kept the temptation down to a small limit. Let us hope that the rise in the values of the product will not give rise to an increase of dubious practices, whether in the city or in the grape-growing districts themselves.

But the blending of wines after fermentation is but an expedient resorted to when the proper blend has not been made at the time when, of all, it should be done, viz.: before fermentation. Mission wine will still be Mission, though you cover it over with a heavy dash of Zinfandel, Burger, or Burgundy wine. But when the blend has been made while both were yet must, the case is different. For the Zinfandel will find use for all its harshness and acidity, in modifying the contrary qualities of the Mission, during the act of fermentation; and the blend thus made will form a harmonious whole, quite different from and much superior to the blends made of the respective wines.

And just here allow me to suggest, that you must not ask the chemist to do all this without your help, in the way of information as to experience had, and as to the points that should be investigated first, as of chief practical importance. We do not work by magic, but simply by refined common sense, brought to bear on facts accurately observed. That constitutes the essence of science. It deals with facts; and for these, it must go to those who have the best opportunity to observe them. Do not suppose that we, or I for that matter, know all that *you know* about these matters as they stand in your valley. They are not on record anywhere, and I have not seen your valley and its vineyards and wineries until this year. Then how should I know? I say this, because not uncommonly, a great many more questions are asked than I can answer with the facts in my possession.

One such is, how best to improve your soils. I wish I could tell you; but I have only seen them for a day or so, within the last few months, and up to this day have no samples of them at my office, although I have asked for them repeatedly, and sent on directions for taking them to gentlemen in your valley. Then, of course, I have not analyzed them—perhaps could not have done so if I had had them. But now, when we get over the vintage work, we will be ready to begin on the soils, if you will but furnish the materials. As we cannot travel and be in the laboratory at the same time, that will be the quickest way to get at it. I have here, for your use, the printed directions for taking soil specimens, which I would specially ask you to adhere to as closely as you can. Work spent on samples improperly taken is worse than useless.

This is but a part of a work I have been trying to carry on under difficulties for several years past. We want an agricultural map of the whole State, to accompany a full description of its agricultural features, so that any one thinking of coming here, can get the information he wants from a disinterested source, and that our own farmers will know something beforehand of the kind of country they will find in any other part of the State. I have been able to do something in that direction during the past season by the aid of the United States Census office; counting in California as one of the virtually, if not actually, cotton-producing States. I am sorry the vintners did not come forward in time, or the whole of the State might

have been included in the investigation instead of the southern and middle portions only. But if the appropriation for the viticultural industry is continued by the Legislature, at least the vine growing districts will be so far investigated during the coming year, that a reasonably accurate map of the kind spoken of can be constructed. One of that kind for the State of Mississippi, just completed for the census, is here before you. It would have been a splendid advertisement for California to have had a similar map in the census report, but I cannot promise that it will be as complete as this. After awhile, we will have special maps of this kind for each district in the State, if my plan is carried out.

There are, however, some things I can tell you about your soils, and about the soils of vineyards in general, and the means of keeping them in good condition as to productiveness.

First, as to the selection of soils for vineyards in general. It is a habit with some persons to say that we must in all things follow Nature's indications. That is a truism, in so far as all our investigations are based on nothing, if not on Nature's facts and indications. But what such persons mean would be in this case, for example, is that we should plant vines by preference where nature plants the wild vines, along creeks, etc. But the consistency of such persons would go rarely so far as to eat Nature's grapes in preference to Alexandria Muscat, which nature has not planted anywhere; and Nature would be badly off if she happened to plant Seedless Sultanas, which, like the Leghorns that decline to sit, would be extinct in one generation.

What we want is to observe Nature's indications carefully, interpret them rightly, and then follow the road to improvement thus found. Our largest wild vines grow on the banks of creeks, but the tallest and most vigorous are not those that bear the best grapes. Precisely the same holds true of cultivated vines. In soils causing the most vigorous growth the quality is inferior, though within certain limits, the product may be larger. Beyond limit's limits, even the quantity of the fruit diminishes, and the quality is very low. This is the case in the tropics, where the little fruit that is borne is watery and insipid. The same tendency occurs on fresh, thrifty soils, and by the agency of manures that cause heavy growth of wood and foliage—ammoniacal compounds, etc.

Thus, when quality comes to be considered, the thirteen-ton soils are not likely to give the best results. They are good enough for eating grapes, and perhaps for raisins, but not for high quality of wines. Mr. Blowers tells me that even for raisins, the maximum crop he finds desirable is six tons per acre.

Now, as to the influence exerted by the several kinds of soils on the quality of wines, let me give you the summary of experience in Europe, as formulated by Nessler, of Germany. They are substantially as follows:

1. Heavy soils, other things being equal, make wines of deeper color, high bouquet, heavy, and of good keeping qualities.
2. Sandy soils make lighter wines, with less bouquet, not keeping and improving so well, and less tinted.
3. Calcareous soils make sweet wine, but with less bouquet.
4. In very hot seasons, heavy soils are better, less droughty than light ones, if well tilled and drained.

5. Dry, stony, alluvial soil makes sweet, strong wine, with good keeping qualities, and less bouquet.

In interpreting these rules, you must not forget the introductory proviso, and that differences of climate modify them.

Again, they are given with regard to soils on which any sensible man will try to make wine at all. It is a pity that in the absence of a proper detailed investigation of soils designated, Nessler's rules are still somewhat vague. But they are good for comparative estimates. I will try to give you a little more in detail, some of the points to be considered in the adaptation of soils to growing grapes for wine making.

The soils least adapted to the production of grapes of high quality are those designated as "cold." A cold soil is not necessarily either "heavy" or "light" in character; it may be either. The characteristic point is that they remain water-soaked until late in the season, or throughout the year; or that, at least, their subsoil is of that character. The presence of the water, and especially its evaporation, prevents their being warmed up to the proper temperature by the sun's rays. Fruit crops that will grow at all in such soils are of sappy habit, and produce a watery, unsavory fruit, lacking sweetness, as well as aroma.

Underdrainage, deep culture, and, in most cases, the use of lime, are effective in correcting the coldness of soils. These remedies must be applied the more thoroughly the more clayey the soil to be treated. A "cold, gray, valley adobe" is about the worst type of the class. The reverse of the cold soils is warm ones. Let us consider what tends to make a soil warm. First of all, water must not stagnate on it, or in the subsoil, at a depth less than eight or ten feet, during the growing season. To this end, the soil should be loose and pervious to the water, though not "leachy." Close clay or adobe soils are, therefore, not naturally warm soils; although they can be made so by judicious treatment.

Besides being loose a warm soil must be *deep*; for if a heavy, cold subsoil underlie it at a little depth, the heat absorbed from the sun's rays will soon be taken by the latter. Worse than this, the roots of plants will remain near the surface only, and later in the season they will be subjected to excessive heat and drought. Moreover, a deep, loose, well-tilled soil will retain, at night, the warmth absorbed during the daytime; the conduction of heat being less rapid, the surface only will cool down below the point congenial to vegetable growth.

For the better absorption and retention of warmth, soils of deep colors are particularly adapted; the more as these colors result from the presence of substances that themselves exert other favorable action. *Humus*—the black vegetable matter of soils—stands foremost among substances absorbing heat; while, at the same time, it is most effectual in rendering the soil easily tilled, loose, and thrifty. Other things being equal, therefore, dark or black soils are warmer than light colored ones. Unfortunately, so far as grape culture for wine is concerned, black humus soils are rarely found out of the valleys.

The substance that stands next to humus in efficacy, as regards the physical effects on soils, is "ferric hydrate," hydrous ferric oxide, hydrated oxide of iron—iron rust, to speak plainly—in the fine state of division in which it colors soils yellow, brown, "mahogany, or red."

It is second only to humus in imparting to soils the quality of absorbing and retaining heat and moisture—not *wet*—and in condensing such important gases as carbonic acid and ammonia, from the atmosphere. In larger quantities, also, it serves to render soils loose and more easily tilled. Of this you can, doubtless, find examples in your own experience. Where red soils are cultivated, there are occasionally wet, ill-drained spots, whose soil is gray or white. These are always inferior to the red soil surrounding them, in productiveness, even though you may drain them. If you do not, they may in wet times be absolutely poisonous to vegetable growth. Stagnation of water in red soils is doubly injurious, for it converts the iron rust into a soluble compound that is deadly poison to roots, just like copperas. The iron is dissolved and washed out of the soil into the subsoil, where it forms “black gravel.” You have seen that a hundred times. It is one reason why valley soils are rarely red; water will stagnate on them once in awhile, and then the iron is leached out. Your mountain sides are red, and your valley soils have come from these slopes; yet the color has been lost by the process I have mentioned. The place of the lost iron, however, has been filled by an accumulation of vegetable matter.

In cultivating red soil, then, you must be particularly careful of good drainage. On the other hand, the fact that a soil is red, proves that it must naturally be well drained.

You now see that there is some reason why “red mountain” soil should yield better vintages (as to quality) than valley lands. They have that reputation all the world over. Then, if you make good wines now, what will you not be able to do when you ascend your mountain sides with your vineyards? The fact is, your best lands for quality of wines, lie idle thus far, with a few exceptions; such as the Schramsberg, and Howell Mountain, soon to be planted by Mr. Krug; and in the Sonoma Valley, notably the Koehler vineyards. All these are “volcanic” soils, reputed to be the best for high-flavored wines.

Next to these should come the granitic and slate soils of the foothills of the Sierra. About these, also, I know but little as yet; and the wines I have seen from that region have not struck me as representing the best that can be done. Each region must find out what kind of wines it is best fitted to produce. Yours is the soil and climate for high-flavored, dry wines; but I do not think you will be able to compete with Fresno and Los Angeles for such kinds as sherry and port, and Los Angeles will hardly produce any Chateau Lafitte or Johannisberger, do what she will.

There is another substance that is an important factor and help in warming soils: it is *lime*. The manifold and fundamentally important services that an abundant and cheap supply of lime can render to agriculture generally, and to fruit, and more especially grape culture in particular, is not yet remotely appreciated in this country. To speak again of following the indications of nature, the best wild grapes, and the greatest abundance of vines in the uplands, is always found in warm, calcareous soils.

Lime does a great many useful things in the soil. It renders the heaviest adobe loose and friable, as I could show you by a simple lecture experiment, for which I am unfortunately not prepared. It favors the rapid decay of vegetable matter into true, black humus; preventing, and if necessary curing all sourness, and enabling you

to drive out weeds that, like the pestilent sorrel, depend on such conditions of soil. It mitigates in a great measure the coldness of soils, rendering them more pervious and more easily tilled. It tends to restrain the development of stem and leaf, in favor of fruiting—a phenomenon well known in the Old World, and abundantly noticeable in the cultivation of cotton in the Southern States. Where the cotton “runs to weed” a dressing of lime will often act like magic, reducing the size of the stalk to one half and quadrupling the bolls it bears.

The price and quality of the lime now sold here are by far too high. There is about Martinez and Antioch an abundance of impure limestone that could be cheaply burned for your use with the help of the screenings of the Mount Diablo mines. It should cost you about half of what you now have to pay, especially if, as is done elsewhere, the transportation companies reduce the freights on fertilizers to a nominal figure. They find that this puts money in their pockets in the end, by the increased production, of which they have the handling.

I cannot tell you whether or not your soils are specially in need of lime. So far as I can judge by their looks, you have no properly calcareous soils in this part of the valley. But the use of lime has another effect of great value, especially to the vintner. Your grapes draw very heavily on the potash of the soil; that is the chief ingredient of the tartar in your casks. In the end, all wine making countries have to use potash manures. But for the present I doubt not that you can supply this need by the simple use of lime. It renders available to vegetation the insoluble potash in the soils, and of that I think yours contain a large supply.

Of other commercial fertilizers I should recommend you to use bone meal where the soil is naturally not strong. I find that the soils of Sonoma are not very rich in phosphates; I presume yours are similar. Excellent bone meal is manufactured by two establishments in San Francisco. Thus far nearly all of it goes to New Zealand and Australia! That fact is rather a sorry comment upon the general condition of California agriculture. It is about time this export was stopped.

Except for the purpose of reviving vines that have suffered from the phylloxera, or other such set-backs, I do not think you should spend your money on any ammonia salts, or ammoniated fertilizer, nor on guano. Even stable manure is hardly in place as yet, where quality is an object, though nothing can be better where weak vines require to be restored. Get as much of it as you can, for use in the proper place. But remember that all ammonia compounds make vigorous, sappy growth, and act against fruiting in general, and against quality in particular. So much for manures, properly speaking. Now, a word about the maintenance of fertility without them. You know that all that comes from the vineyard has, to a certain extent, drawn upon the plant food in the soil, and this you must at some time restore by the purchase of manures, to the extent to which you fail to bring the refuse. The first and fundamental rule for the maintenance of fertility is always that you should return to the soil everything that grew on it, unless its market value is such as to make it more profitable to sell it, and make returns by purchase of manures, or otherwise.

Let me tell you what a failure to make such returns has cost the

cotton States. Their marketable product, cotton, lint, or wool, contains just one eleventh of the plant food that the whole crop, including the seed, takes from the soil. So small a deficit would not be felt for a century, on a good soil, if ever; and experience as well as analysis show that when the cotton seed is regularly returned to the soil on which it grew, the latter not only does not deteriorate, but often actually improves. Thus, cotton could be grown indefinitely without manure, on a soil of fair native fertility. Now, what have they done? I will tell you. They have, for thirty years, tried to get rid of their cotton seed without putting it back on the land, even by hauling it for miles across the cotton fields to the bayous, to sent their very essence of fertility down to the Gulf of Mexico. It has rotted around the gin-houses and created typhoid fever and diphtheria; the latter have been located on the banks of flowing streams in order to obviate this trouble, and to be able more effectually to get rid of the nuisance. This waste is going on even now while I speak, in the Mississippi cotton region.

And the result? Well, you can see it in waste fields lying out all along the routes of railroads, which are now kept transporting to these depleted soils the bone and phosphate fertilizers of Carolina and Chicago. Need I say more?

Few crops present so extreme a case as cotton. Your wines carry off very much more, in proportion, than does the cotton lint. But so far as it goes, your pomace represents the cotton seed, your prunings the cotton stalk. Even after distillation, the pomace, though not as rich as before (a good deal having remained in the wash), is still a fertilizer highly to be prized. So with the lees, the refuse grapes, etc. Timely attention to this point will save you many dollars in the purchase of manures, in the future.

More of this after more soils are analyzed. For the present, look well to the phylloxera, and when you have made sure that you will be able to repress it—which I think you soon will be—be sure to strive first and foremost for the establishment of the reputation of California wines both for quality and purity, rather than for quantity per acre. No grape sugar—none is needed here except for pomace wine, and you had better not make that till the reputation is established firmly. Now is your golden opportunity; and if you act wisely, energetically, and unitedly, you are sure of success.

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FIRST REPORT

OF THE

COMMITTEE ON THE PHYLLOXERA,

VINE PESTS,

AND THE

DISEASES OF THE VINE.

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# REPORT OF COMMITTEE

ON PHYLLOXERA, VINE PESTS, AND THE DISEASES OF THE VINE.

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*To the Board of State Viticultural Commissioners:*

GENTLEMEN: Your Committee on "The Phylloxera, Vine Pests, and Diseases of the Vine," do respectfully report as follows:

The work assigned to this committee involves so much original research, as well as study of known authorities, and covers so large an extent of territory, viz.: the vineyards of a State nearly as large as the republic of France, that we only pretend to have made a small beginning in the labors to be performed.

We have considered the ravages of the *Phylloxera-vastatrix* of the most pressing importance to investigate, and have up to this time devoted most of our attention in that direction.

## THE PHYLLOXERA-VASTATRIX.

Concerning the entomological nature of this pest, we refer you to the interesting lecture delivered by Dr. Hermann Behr, at Sonoma, on the occasion of the first viticultural meeting of the Sonoma District (see Appendix A); also, to the illustrations of the insect, obtained from Professor C. V. Riley, of Washington, D. C. (see Appendix B); also, to the reports of Professor E. W. Hilgard, of the University of California; also, to the valuable works of Professor C. V. Riley, of Washington, D. C.; and the French authorities, which are many, important among which are, however, those of Professors Planchon and Foex, of the National School of Agriculture at Montpellier, Department of the Herault, Maximé Cornu, and the reports of the Phylloxera Commission of the Academy of Sciences of France.

We shall not enter into any discussion of any disputed points relating to the origin of this pest, nor into the question whether it is cause or effect of disease in the vine; it is sufficient for us at present to have determined by careful investigation that the pest in this State is identically the same as that which has caused so much damage in France and other countries; we find only an apparent difference in our favor in the slower progress which it makes with us. Professor Hilgard has turned public attention to the fact, that the fertile-winged female form is rarely found in our affected vineyards, which may account for the slow progress referred to. It will be important to ascertain whether other conditions, such as virgin soils, more vigorous vines than in Europe, climatic influences, etc., retard the development and spread of the insect, or furnish the vines with resisting powers.

In the consideration of all these original questions, as well as of those pertaining to remedies, we shall greatly rely upon the assistance of

scientific experts, skillful inventors, and intelligent observers among the people, all of whom we cordially invite to coöperate with us in this work. We regret that this committee has not sufficient means to obtain accurate translations and copies of illustrations from all the most important foreign authorities, and that the appropriations for the use of the Board are insufficient for even the work of this committee alone. We respectfully recommend, therefore, that adequate appropriations should be asked for, to enable this Board to direct experiments and impart instruction, with the especial object in view to extirpate the pest, or at least to prevent its progress and destructive agency; and, that this work may be more intelligently performed, we think that the purely scientific study of its nature and habits should be intrusted by the State to a State entomologist, appointed not only for this purpose, but also to investigate all insect diseases affecting any industry of our people.

#### PRESENT EXTENT OF THE RAVAGES OF THE PHYLLOXERA.

Unfortunately the work of investigating this subject systematically has been delayed so long by the State, that it is now difficult, perhaps impossible, to ascertain the true date of the first appearance of the disease, or the circumstances which might lead us to determine its origin. The search after the history of these ravages comes therefore next in importance to the investigation of their present extent, which we shall now refer to.

Believing that it was important for the people of the State to know as nearly as possible, with accuracy, the full extent of the dangers to which viticulture is exposed, the exact locations of the infected vineyards, and where precautions must be taken to prevent further spread, your committee first attended the viticultural meeting held at Sonoma on the twenty-third day of July last, and there agreed with Professor Hilgard, of the State University, to unite with him in sending out an investigator for our joint benefit to examine the vineyards of the State, and to report, without fear or favor, wherever the phylloxera could be found. The gentleman selected for this work was Mr. F. W. Morse, a graduate of the University, now pursuing scientific studies, and qualifying himself by work in the laboratory as well as in the field, for expert labors in viticulture. We preferred to begin in this way, inasmuch as the lack of experts and careful observers is a great disadvantage to the State, and our aim should be to educate such men from our own youth, giving them all the opportunities for study and accumulating experience that we can. The wisdom of our choice is apparent in the results of our first investigations.

Mr. Morse, under joint instructions from this committee and the State University, first visited the town of Sonoma and its vicinity, remaining long enough to become familiar with all the prominent indications by which the presence of the insect may be detected or suspected, examining roots of diseased vines by means of personal labor, aided with a simple microscope, and acquiring general knowledge concerning the progress of the disease. Then he visited all the most important vineyards in the following counties: Napa, Solano, Yolo, Placer, El Dorado, San Joaquin, Fresno, Los Angeles, Santa Clara, and Alameda. Our means for defraying expenses having been more than exhausted, we could only complete this partial reconnais-

sance by instructing him to return to Sonoma County and trace there the extent of the affected vines.

The details of his observations, continuously made from August 6 to September 25, we shall leave to be set forth in Professor Hilgard's report. We are only satisfied with them so far as they give us positive information of the presence of phylloxera in certain places, and a fair presumption for believing that others are not affected. Our work cannot be thoroughly satisfactory until we are enabled to keep an expert constantly employed until such time as we have mastered the subject.

Through Mr. Morse's observations, we find that the phylloxera exists now in Sonoma, Napa, Solano, Yolo, Placer, and El Dorado Counties; south of those counties he did not discover any traces, although it should be said that he did not have time to visit the foothills of the Sierra Nevada south of El Dorado, nor the coast counties lying between Santa Clara and Los Angeles. North of the counties affected, our researches have not yet been extended; we have, however, information from all the leading viticultural regions.

In Sonoma County we find the disease confined to the small valley of Sonoma; rumors reached us of its existence in other places, but upon examination it was not found. The public should not confound the Sonoma Valley with the county of which it is a small though valuable part.

In Napa County the phylloxera was found generally in the vineyards of both sides, from the lower part as far as Yountville. In the more important viticultural districts of Saint Helena, from Yountville to Calistoga, only one infected vineyard has been found.

In Solano County several places were found infected.

In Yolo County, the cause of the small yield of the well known Orleans Hills Vineyard was discovered to be due to phylloxera; one other small vineyard was found to have been affected.

In Placer County what has been known as the Nickerson Vineyard was found affected.

In El Dorado County two vineyards near Placerville were found diseased, and indications were noticed in another place to the west, where no opportunity to examine roots was obtained.

In making these observations we are indebted to the cordial coöperation of viticulturists generally throughout the State. To their honor, it may be said that with few, if any exceptions, do they attempt to conceal the truth. The only opposition to these investigations, that we have heard of, has been caused in the Sonoma Valley, through the discontent of certain parties, who complain that the talk of phylloxera prevented one or two sales of infected vineyards; the most prominent of the complainants being a capitalist, whose funds are largely dependent upon vineyard securities in the infected parts, and who strenuously insisted that the phylloxera danger was a mere bugaboo. We would not mention these unreasonable complaints, excepting that they have, by added misrepresentations, seriously impaired the opportunities of this Board for the public good, by alienating from us the hearty coöperation of some people whose interests are best subserved by harmonious action, truth telling, and making known their necessities for the intelligent guidance of our State and national governments.

## HOW SERIOUS THESE DANGERS ARE.

We should not conceal the fact that the presence of the phylloxera in this State seriously menaces the prosperity of an industry that is destined to be one of the chief resources of the people; but it does not appear to us so great an evil as many suppose. If nothing should be done to check or extirpate the insect, a supposition which we do not consider fair to entertain, the slow progress of the ravages, judging from past experience with us, gives us a large margin of time for vineyards in infected places to continue to be profitable, and leaves the planting of new vineyards in unaffected places safe fields for investments, the profits of which will amply cover all losses before destruction can take place. In this State we have vast areas of land suitable for the culture of the vine where it may be planted, and with reasonable hope of security quarantined against the introduction of disease, while infected places may be allowed to rest, or cultivated in other ways. Such conditions, unhappily, do not exist in France, Spain, and other countries, where this pest is so much feared. Moreover, we have sections of country where the soil is of such a sandy nature, that little is to be feared from phylloxera, also places where submersion of vines may be practiced. And, still further, although we have vineyards already planted to protect, the vineyards to be planted are vastly more in acreage, and the planter may select phylloxera-proof varieties of American vines to graft upon, or to cultivate for their fruit. In France this question is more formidable, because, first, the pest has gained such headway while scientists have been studying it, and wars have obstructed national action, that when the remedy is found, whole districts have been destroyed; second, because, generally, the viticultural lands are worn out and useless for other culture; third, because the energies of the people cannot find virgin soils to operate upon in extending the areas of new vineyards. So, viewing this question in the worst light possible, it is not so alarming to our State as would at first appear; nevertheless, the losses that may be suffered, and the insecurity of capital invested, which now has been estimated at thirty million dollars, bring the subject-matter forcibly before the public mind and challenge grave consideration on the part of legislators.

The phylloxera was not known to exist in any of our vineyards until 1873, but circumstances preceding indicate that vines were affected by it as far back as 1860, and probably earlier; it was not detected in France until 1865. How long it had existed there then, no one knows. The current opinion among entomologists is, that it was introduced into France on cuttings of American vines (not Californian) which were being propagated at the time the total destruction of French vines from oidium was feared. That was ten or twelve years prior to the actual discovery of phylloxera in the Valley of the Rhone. The gall louse, affecting the leaves of vines in America, the roots of which are not attacked by phylloxera, is claimed to be the same as the latter, which is found on the roots of the cultivated European varieties. It is possible that the phylloxera was introduced into this State upon vines from States east of the Rocky Mountains, the Catawba, Isabella, etc.; but if we must show that it came to us on European roots and cuttings, twenty or twenty-five years ago, it is difficult to reconcile this hypothesis with the French theory of its first introduction into Europe from America, because

vineyards have been found here which appear to have suffered from the pest as early as 1860, the vines of which were imported directly from Germany; no other vineyards being within many miles of the affected place here. This leads us to encourage scientists to still further study the origin of the phylloxera.

The history of the disease in the Sonoma Valley is shrouded in mystery, and it is now impossible to obtain satisfactory proofs as to origin. It has probably been there at least twenty years, but the evidences of its development and progress are matters of conjecture, and circumstantial only. We refer you to the report prepared for this committee by Mr. H. Appleton, of Sonoma, one of the sufferers. (See Appendix C.)

As soon as our investigator, Mr. Morse, discovered the phylloxera in the Orleans Hills Vineyard, in Yolo County, there seemed to be a possible chance to trace its origin, because that vineyard is situated in such an isolated place—distant from other vineyards—that contamination most likely was caused by introducing germs upon the cuttings or plants, rather than after they were growing in place, by the emigration of insects. We have taken pains to learn something of the early history of the planting, and refer you to the report of Mr. Knauth, who planted it. (See Appendix D.) Mr. Knauth recognizes now that a disease which troubled him twenty years ago must have been the phylloxera, which now afflicts the same place. He imported his cuttings direct from Nassau, Germany, in 1853, propagated them in Sacramento, and planted the vineyard in 1859-60. If, then, he introduced the phylloxera with his cuttings, it appears that he must have brought the germs from Germany in 1853, which was about the time the French believe it was imported into France from the United States. At that time it was unknown in France or Germany, and is still little troublesome on the Rhine.

We have evidence, however, that the disease has been in the Sonoma Valley and on the Orleans Hills twenty years. Vines were dying in unfavorable soils twenty years ago in both places. The progress since then has been nothing alarming, except to those whose vineyards are planted in shallow, poor, and clayey soils. The Buena Vista vines, in Sonoma, are dead or dying where the soil is shallow and overlying a bedrock of sedimentary lava deposits; but in the lower ground, where the soil is deeper and finer, fair crops are still taken. In the Orleans Vineyard, the vines in the adobé (clay) soils at the base of the hills are dead, while those on the hills, where there is a more friable soil, with a hard, sedimentary substratum, the vines still live, and yield what would be considered in France fair crops. Continued and fatal work has only been noticed of a serious character in shallow soils, especially when underlaid by a bedrock, or in stiff clays or adobés, which crack open and are full of dry seams in Summer.

In the southern part of the State, where alluvial soils are cultivated and irrigated generally, no phylloxera has yet been found. In Napa County, shallow hillside soils are affected, while no infection has yet been noticed in the deep, gravelly loams of the St. Helena District, the only two places affected in that vicinity being hillside vineyards, one at Yountville and one near St. Helena. In the sandy soils west of Santa Rosa, in Sonoma County, the insect has not yet appeared.

From these observations we can only deduce general opinions. Nothing is yet certain, for time has been lacking, and means as well,

for conducting perfect examinations. We can, however, point out the fact that the phylloxera has apparently been in the Sonoma Valley and the Orleans Hills about as long as it has been supposed to have been in France. During that time it has devastated one and a half million acres in France, sweeping fatally through entire districts, while it has yet failed to destroy the vines of the little Sonoma Valley, or even entirely the vines of vineyards where it first appeared, and has killed the vines of the Orleans Hills only in the adobe soils. We have, therefore, no reason to fear any speedy destruction of California vineyards, while we have good reason to believe that by energetic action, aided by proper legislation, we may rid the State of the pest; and we know that in certain soils and under certain circumstances the viticulturist has no reason to dread this enemy at all.

#### THE REMEDIES FOR THE PHYLLOXERA.

Concerning remedies for the phylloxera, there is little yet to be learned from experience in this State. We are practically dependent upon the results of experiments made in France, in making our recommendations, although we hope much light will be thrown on the subject by the intelligent works that have been begun lately among us. The French reports of the Phylloxera Commission of the Academy of Sciences, of the National School at Montpellier, of the various departmental societies and commissions, are so voluminous that we cannot at this time pretend to give a synopsis of the actual work that has been done. Stimulated by munificent offers of prizes, the scientists of Europe have greatly exhausted their resources in their efforts to find the best cure. A careful examination of the best authorities enables us, with confidence, to recommend:

*First*—Planting vines in sandy soil.

*Second*—Submersion of vineyards, when practicable, to destroy or arrest the phylloxera.

*Third*—Among the insecticides, the use of bisulphide of carbon, accompanied by appropriate fertilizers, chief among which should be potash.

*Fourth*—Grafting upon certain varieties of native American vines, the roots of which experience so far shows to be proof against the pest.

What is known with certainty, accompanied by proof in practical viticulture, is to be collected under the foregoing heads.

Inasmuch as we have no trouble from phylloxera yet, where the vines are in sandy soil, or where they may be submerged, if necessary, our present work is mainly, therefore, to be directed in the lines of insecticides and grafting.

#### INSECTICIDES.

Concerning the use of the bisulphide of carbon, which has heretofore been too expensive for general application and extensive experiment, we are happy to announce that one of the first practical results of our efforts, in awakening inquiry, has been the establishment of a factory for the manufacture of the sulphide, at West Berkeley, and, in justice to the State University, we should not forget to mention that it is to another of its graduates that this honor of instituting an enterprise for the benefit of agriculture is due, Mr.

John H. Wheeler, whose report to us is submitted herewith. (See Appendix E.) Mr. Wheeler will soon have his factory in working order, and proposes to sell the bisulphide of carbon in suitable packages (packages to be returned), at the rate of eight cents per pound, which is far more favorable to the vitiiculturist than could have been hoped from any other source than that of the energy and public spirit of a Californian youth, educated in our own State, and ambitious for the welfare of the people from whose support the university which educated him has drawn more than one such advantage for the State. Heretofore the price of the sulphide has been, in California, about thirty cents per pound.

Concerning the methods of applying this insecticide, we refer you to the instructions of the Paris, Lyons, and Mediterranean Railroad Company, translated from the French, for this committee, by Miss Anna Louise Wetmore (see Appendix F); also to the translations of correspondence between M. Frémy and M. Thénard, made by Dr. John I. Bleasdale, Secretary of this Board (see Appendix G); and for further information concerning the efforts that have been made in France to check the pest, to the abstracts of the reports (*Comptes Rendus*) of the Phylloxera Commission to the French Academy of Science, also made by Dr. Bleasdale. (See Appendix H.)

Your committee, while recommending the bisulphide of carbon, do not wish to be understood as indorsing it as the *only* effective insecticide for the destruction of phylloxera. So far as experience in France has proved it, it appears to be the only well known remedy, which practical work has demonstrated to be valuable. We have, however, great hopes that still more economical and less objectionable remedies will be discovered.

A great impetus to the inventive spirit of our local scientists and inventors was given by the important meeting held under the auspices of your member from the Sonoma District, at Sonoma, before referred to. We have already received notice of three or four remedies, each of which is claimed to be effective and new, each being the invention of a chemist, the preparation of which is kept secret, while the inventors are taking steps to secure their rights by patents. In only one case, however, has the inventor trusted us with the knowledge of his secret, viz.: the process of Professor D. Mindeleff. Being satisfied, after examination of the French reports, that a material used by him had not been experimented with, and the principle of the application appearing to be good, we have caused some preliminary experiments to be made, with a view to determining whether actual application in the soil would impair the insecticidal power of the remedy. This has been done with satisfactory results, although we have yet to determine whether it can be used effectively without injury to the vine, which seems probable.

Mr. G. Groezinger reports a remedy, the invention of a chemist, upon which private claims of patent right will be made. We know nothing of it, excepting that it is claimed to effect the destruction of the phylloxera in a few hours, without injuring the vine, and that it has been applied in Mr. Groezinger's vineyard.

On the New Orleans Hills vineyard, last Winter or Spring, a strong solution of bluestone (sulphate of copper) was applied to the trunk and spurs of the vines and to the roots to the depth of about six inches. The outer bark had first been scraped clean. This was done before the phylloxera was known to be the cause of the weakness of



the vineyard. The improved condition of the vines this year, and the fact that when the phylloxera was discovered there in August, it was only found below the depth to which the bluestone was applied, very naturally misled some into believing that bluestone could be recommended as a cure for phylloxera. Undoubtedly so far as it can be applied directly to the roots and wood of the vine, a destruction of phylloxera and fungoid diseases will take place; but when applied to the soil, to affect the insects upon the hidden roots, it is ineffective, for it has been tried in France, because chiefly the sulphate of copper is neutralized by lime in the soil. Scraping the vines, burning the prunings and dead leaves, and washing with bluestone, would undoubtedly greatly assist, not only in retarding the spread of phylloxera by killing germs hidden in the bark, but also in exterminating germs of the several fungi, which are scarcely less to be dreaded than the phylloxera. It might also retard the spread of the leaf hopper.

In order that experiments may be carefully made and fairly reported upon, this Board should have power and means to establish local experimental stations in affected districts. The want of such aids has been seriously felt this year. Until we can obtain the means for such work, we earnestly recommend that the viticulturists establish stations themselves, and appoint skilled experts to attend to them, and report in detail upon all circumstances of their experiments.

For a short time we engaged Mr. H. Appleton, at Sonoma, to make daily observations with the aid of traps (mucilaginous coated cloth, etc.) for the purpose of detecting whether the winged phylloxera could be found migrating. Although this was patiently done, none could be found. Perhaps the work was begun too late in the season (August), and to be more certain further work should be done next year. The only winged females thus far discovered, and reliably attested, within our knowledge, have been developed from infected roots after they have been placed under glass. Experiments similar to those of Mr. Appleton's were conducted also by Colonel George F. Hooper, at Sonoma, but with like results. There appears to be reason, therefore, to believe with Prof. Hilgard that the slow progress of the pest in this State is due to the absence or rarity of the winged migrating female, or the infertility of those that do exist.

We have one further important observation to make concerning dependence upon insecticides. No permanent good can be accomplished in any affected district unless *all* the vineyards, which may possibly infect each other, are thoroughly disinfected. Therefore, until State or national aid can be obtained, it is important that local district coöperation among proprietors of healthy as well as diseased vineyards, should be resorted to, the common enemy being fought by united action on the part of all interested, either in self-defense, or prevention of the threatened invasions. Even without laws for that purpose, we doubt not but that the good sense and common goodwill of neighboring vine growers will enable them to enter into compacts to enforce sanitary regulations and quarantine rules. All cuttings passing from one vineyard to another should be disinfected, not only to prevent the possible transfer of phylloxera, but also to keep out germs of fungus. Rooted vines, when needed, should be grown from disinfected cuttings, and avoided, as much as possible, when brought from other places. Particular attention also should be given to disinfecting cuttings or roots imported from the East,

notwithstanding they may be phylloxera proof. Though they may be proof themselves, they may harbor the insect and spread contagion to other vines. There is an imperative necessity for a law preventing the importation of any vines which do not pass inspection and undergo disinfection by a State officer appointed for that purpose. The State has many millions of dollars of taxable property to protect, and vastly more in prospect; her revenues are at stake in the question, just as her vital strength is, when threatened by contagious diseases affecting human life.

#### PHYLLOXERA-PROOF VINES.

Although all the cultivated varieties of vines of European or Asiatic origin (*vitis vinifera*) do not, with equal facility, yield to the phylloxera, yet none have yet been found which successfully resist its attacks. Whether this is due, as some think, to the exhaustion of the vitality of the vines by long culture without recourse to the seed as a means of propagation, or whether the *vitis vinifera* varieties are constitutionally and from their origin different from the American resisting stocks, we shall not attempt to discuss, preferring to leave all debatable ground for further study by scientists.

North America is rich in distinct species of the wild vine, while in Europe and Asia only one (*vitis vinifera*) is known.

The species of American wild grapevines are as follows:

1. *Vitis Rupestris* (Schule), the bush grape or sand grape.
2. *Vitis Cordifolia* (Michaux), Winter or frost grape.
3. *Vitis Riparia* (Michaux), riverside grape.
4. *Vitis Arizonica* (Engelmann), Arizona grape.
5. *Vitis Californica* (Bentham), California grape.
6. *Vitis Aestivalis* (Michaux), Summer grape.
7. *Vitis Candicans* (Engelmann), Mustang grape of Texas.
8. *Vitis Labrusca* (Linnæus), northern fox grape.
9. *Vitis Vulpina* (Linnæus), southern fox grape or Muscadine.

From the third, sixth, eighth, and ninth, by culture, seedlings, and hybrids, have been produced the several hundred varieties of American grapevines. Those who desire to know how the cultivated varieties are classified under these heads, should consult the work of Dr. G. Engelmann, prepared for the "Bushberg Catalogue," of Messrs. Bush, Son & Meissner, St. Louis, Mo. Among these, experience has shown that the *Labruscas* do not resist the phylloxera much better than the *Viniferas*. Experiments with the *Arizonica* and *Californica* have been begun only during the last year. All the others appear to be resisting vines; but the weight of evidence appears to be in favor of the wild *Riparia* and *Rupestris* for grafting stock. One of the members of this committee had an opportunity in 1878 to inspect the experimental vineyards of the National School at Montpellier, in France, and then reported that only the pure wild stocks, with the exception of the Jacquez, were perfect in their resistance when subjected to severe tests; the cultivated and improved varieties varying more or less in their degree of resistance. Later, on the 6th of April, 1880, Professor Foex, of the Montpellier School, wrote to Mr. Wetmore as follows: "The types which we prefer are, for the sake of their fruits, the Jacquez (or Ohio, Cigarbox, etc.), Herbemont

(or Warren), and the Black July (or Devereux Lenoir). For grafting stock we prefer the wild *vitis Riparia*, which is sent to us from Missouri, Iowa, and Kansas, and the *vitis Rupestris*, from 'Texas.'

If, therefore, it is a question of propagating American vines for the sake of their fruit, we must be content with a less degree of resistance; but if we desire only grafting stocks, we should cultivate for that purpose the pure wild vines, and we are recommended to use the *Riparia* and *Rupestris* by the best known authority on the subject. As experiments are further advanced, others may be equally recommended, and possibly the *vitis Californica* and *vitis Arizonica*.

Several large orders for American cuttings have been made for this Winter, notably one for one hundred and twenty thousand cuttings, by Mr. J. W. Simonton, to be planted in his vineyard, near the dividing line between Napa and Sonoma Counties.

We refer you especially to the translation of a synopsis of lessons on grafting American vines, given at the National School at Montpellier, by Professor Foex. (See Appendix I.)

Concerning the cause of the resistance of American vines, there are two prominent theories advanced, each well supported by evidence. Professor Foex demonstrates that the bark of the roots is denser and the woody fiber tougher with the American vines than with the European, and attributes resistance to this cause, the insect being unable to cause mortal lesions. Another theory is based on the presence of a greater quantity of resinous matters in the American roots. Possibly resistance is due to both causes combined.

#### OTHER DISEASES OF THE VINE.

*A new fungoid disease.*—Your committee have found that a grape blight has done considerable damage throughout the State, and seems to be increasing year by year in its destructiveness. It may be readily recognized by the scorched appearance of the foliage and young growth of vine, later small black specks appear on the grape, and when badly affected the clusters dry up entirely. It is thought, by competent authority, to be a fungus, of which spheria is the head and not oidium. As a remedy, we recommend the liberal use of powdered sulphur, to be applied as a preventive, just before the bloom forms, or when the new growth of vine is about six inches in length, to be again applied whenever there is the least appearance of the disease.

*Sixth.*—The thrip-fly, or leaf-hopper, has done considerable damage in certain localities, and created some alarm. It harbors through the Winter on the ground under the dry foliage of the vine, and it may be easily exterminated by raking the leaves together and plowing them completely under ground during the Winter. The cut-worm, or budder, may be destroyed by turning pigs into the vineyard during the Winter, or by stirring the soil very early in the season.

Other matters relevant to diseases of the vine will be discussed in the general reports of the Commission.

Respectfully submitted.

I. DETURK, Chairman.



## APPENDIX A.

## THE PHYLLOXERA-VASTATRIX.

[Address of Dr. Herman Behr, before the Sonoma District Viticultural Meeting, at Sonoma, July 23, 1880.]

GENTLEMEN: When we have to defend ourselves against constant and repeated attacks of an enemy, our first step must be, in order to render our defense successful, to study the character and habits of the enemy and his hostile as well as friendly relations to others; for the friend of an enemy is an enemy, and his enemy is an ally.

Such is the case of the phylloxera; and before we consider our chances of warfare, and begin to attack, we ought to study the development of the evil and the various disguises under which it perpetrates its insidious devastation.

## DEVELOPMENT OF THE PEST.

In all countries that have a real Winter the phylloxera hibernates in the form of an egg. The more the Winter approaches in its character a mere rainy season, the more the phylloxera develops a tendency to stay over the Winter as a perfect insect, in a more or less dormant state. This last form of hibernation seems to be the rule in California; but the circumstance that the egg has not yet been found is no proof that it should not exist.

The statements of Planchon, Lichtenstein, and Balbiani, all careful observers, agree perfectly in the description of the insect that comes out of the hibernating egg. This insect tries with its proboscis different spots on the leaves of the grapevine, and after having selected a locality, fastens itself there, producing by the irritation of this process a swelling of the leaf that grows out into a gall, not unlike those caused by the sting of the gallwasp. Inclosed in this gall, the phylloxera, without having had any sexual intercourse, lays eggs. Planchon has counted them up to nearly eight hundred; and, after having laid the last egg, the phylloxera dies and dries up, surrounded by the eggs that soon give birth to a breed of phylloxera. These insects, after having escaped through a fissure on the top of the gall, go through the same process of multiplication by eggs in time of three weeks, only their offspring is considerably less numerous than that of the first generation, developed out of the hibernating egg. Mr. Fatio has observed the phylloxera, after having tried several leaves, to descend to the root of the grapevine and inclose itself there in a nodosity analogous to the gall of the leaf. At any rate, it is certain, although it has not been exactly observed, that the phylloxera, sucking the sap of the roots without being inclosed in

nodosities, are the descendants of the gall, as well as the nodosity-building variety.

Toward the end of the year the phylloxera appears under a new garb. It looks quite a different being, and has adopted the form of a diminutive four-winged fly. This tiny insect has but little command over its flight. It is the toy of any current of air. Thousands of them perish in spider-webs and pools of water, and very few are carried by a lucky wind to a spot favorable for laying a foundation for new generations. This the winged phylloxera does by laying eggs, of which she carries only a few (2-5), but of two kinds: small ones, out of which come males, and larger ones, out of which come females, both wingless. The female of this generation harbors only a single egg, and this is, in the insect kingdom, a very exceptional circumstance. This is the hybernating egg, out of which comes the founder of the many generations which follow, and which are non-sexual themselves. As far as this goes the habits of the insect are well observed, and everything is clear. But as to time and circumstances, when the phylloxera leave the gall-building and move about on the roots without inclosing themselves and their offspring, nothing is known. Maybe the nodosities on the roots are the product of generations that link the gall-builders to the phylloxera of the root; maybe that galls, as well as nodosities, are only the product of adaptation. There is one thing certain, that there exist districts infected by the phylloxera, where galls have not yet been observed. Another mystery is connected with the appearance of the winged generation and its offspring of wingless males and females.

It has been observed, and not only in the phylloxera, but also in the insects of analogous organization, that an indefinite number of non-sexual generations can follow through years without once producing a generation of males and females. Another queer circumstance is the great irregularity in the appearance of said winged generation and its sexual offspring. The duration of this state is short enough. A few days are sufficient to make them disappear without leaving any trace but the fertilized egg. The phylloxera can propagate through an indefinite number of generations without once appearing in the winged state. This shows that the winged generation is not necessary for the existence of the species. What is then the object, the function of that form? We may, perhaps, express the circumstance in the following way: When we recollect that it is chiefly in climates of a severer Winter where the winged phylloxera has been observed, and there always late in the season, and when we further consider that the fertilized egg, which possesses a much slower development than the non-sexual, which develops shortly after its being laid, so all these circumstances seem to point to the fact that this fertilized egg, by the very slowness of its development, is better calculated to resist the inclemencies of the Winter than the ordinary egg with its quick development, or the phylloxera herself in her torpid dormant state of hybernation. There is in this circumstance an analogy to certain water plants producing two different kinds of spores—moving spores, which have to sprout after a short time or perish, and resting spores, that can remain latent for a long space of time and develop as soon as circumstances become favorable.

Now, these moving spores swarm and sprout till all the water in which they took their first start is filled with their gelatinous masses; but when, at the end of a season, or when by any other circumstance

the water begins to dry up, the resting spores are formed, mix with the slime of the pool, when this slime is pulverized by dryness and heat, are carried with it to places where sufficient moisture favors their development, or remain latent at the bottom of the pool till rain or inundation fill it again. Now there is perhaps some analogy between the circumstances that produce in the alga, the resting spore, and in the phylloxera the fecundated egg of slow development. Either of them waits for a time or a place more favorable for its development. Under ordinary circumstances, the resting spore of the alga develops with the first rain, the fecundated egg of the phylloxera with the sunshine of Spring. Exceptionally, when the supply of water becomes scarce, the resting spore trusts itself to the wings of the wind; if the sap of the grapevine of one locality begins to fail, the phylloxera is carried by its winged mothers to new localities. In this way, perhaps, we may account for the irregularities in the time of appearance in regard to the winged phylloxera of milder climates.

#### WONDERFUL POSSIBLE INCREASE OF THE PEST.

Now, let us calculate only eight generations through the season, each member of a generation producing only twenty eggs, which is a very low average figure, as the individuals bred from the hibernating egg alone produces, according to the statements of Planchon, up to eight hundred, and we come to the astonishing figure of two hundred and fifty-six billion. Happily there are circumstances that prevent that figure being reached.

#### THE ENEMIES OF PHYLLOXERA—NATURE'S REMEDY.

Nature always tries, and tries successfully, to restore a balance of power in her productions. The phylloxera itself, or at least its devastations, are a consequence of the balance in nature being disturbed by the culture of a single plant in certain localities to the exclusion of others. We will now see what plan nature adopts for destroying the phylloxera. We have seen how the exclusive culture of the grapevine has attracted and multiplied the parasite that feeds upon it. In the same measure, now, multiply the beings that prey upon the phylloxera, and they also will disappear, or at least diminish, when the phylloxera has been reduced to a number that does not any more disturb the balance in nature. Not all the enemies of this parasite are known. I am to enumerate here only those whose predilection for phylloxera blood is well established, and sufficiently effective to come under our consideration. The phylloxera, owing to her subterranean habits, is not very accessible to birds. The influence of birds on insect life is generally overrated. Amongst the insects that know how to find the phylloxera are some beetles of the tribes called Carabides and Staphylinides that destroy, in all their stages of development, a great number of phylloxera. Staphylinides may occasionally be seen on grapes. They do not feed on them, but are apt to impart to the grape a disagreeable smell. But we had better allow them that little extravagance, as during their long existence in the larva state they live chiefly on animal food—on fellows that are smaller than themselves.

There are several beetles related to the Spanish fly that feed in their larva state on and under ground, on eggs and small larvæ of

aphidians, as well as grasshoppers. Certain wasps, that keep their young ones in subterranean galleries, feed them also on phylloxera and its relations. You probably have observed on the stocks of rose-buds infected by leaf-lice (aphis), a little green maggot, shaped like a leech, and moving about very much like such. This is the larva of a fly (syrphus), somewhat smaller than our housefly. If you observe what he is doing there, you will find that it is not for the sake of company that he frequents that crowd of leaf-lice. A similar maggot, only smaller, visits stem and root of the grapevine, where it devours considerable quantities of phylloxera. Then there is a tribe of four-winged flies, somewhat of the structure of the dragon fly, but considerably smaller, and the wings neither elevated (agrion) nor flattened out like those of the real dragon flies (libellula), but folded round the body, like those of a moth. This insect, called hemerobius, destroys, in its winged state, apidians, and perhaps also some gall-building phylloxera; in its wingless larva state, it preys on aphidians of all kinds, following them from leaves to twigs, and from twigs to stems, from stems to roots. It has been found in company with the phylloxera, of course not as their friend. The class of the spiders and mites (*Archnidæ*) are all carnivorous, and many species prey on the plentiful and defenseless phylloxera.

A French lady, Madame de Bompar, mentions especially a little mite called trombidium as an active destroyer. I am not quite satisfied in regard to the predilection of this little being for the phylloxera; at least it lives not exclusively on aphidians. Mrs. Wetmore, who raises in a box our native grapevine (*vitis Californica*) for the sake of experiment, found a great many of these minute mites on the roots, where we could not trace a single phylloxera. But the web-making spiders do really good work; especially the smaller species of ground spiders, that fasten their nets between twigs, are perhaps even of greater use, as they destroy the winged generation, inaccessible to all the destroyers enumerated before. How many of the winged aphidians die without being able to propagate, we can form an idea by examining those spider webs that are left by their owners, so that the tiny customers that caught themselves in their meshes are no more removed. There may be many more enemies of the phylloxera besides those enumerated, for many things that happen every moment among the little things under ground escape our notice. It is certain there are more victims of that microscopic warfare than we generally imagine. Entomologists are well acquainted with the fact that insects that are excessively common through a certain time, disappear sometimes suddenly as if swept away by an epidemic. At any rate a diminution of the phylloxera pest is to be expected before they have ruined our vines.

Among the insect pests mentioned by different authors, there is perhaps none that bears so much analogy to our case as the invasion of the apple trees of northwestern Europe by a certain relation of our phylloxera, the myzoxylus. I once found among old papers an account of the devastations of this insect, the despair it caused in the cider-making districts, and very many remedies recommended. The insect still exists, but in very moderate proportion. Which of the many remedies recommended has reduced the myzoxylus to a more reasonable style of living I could not find. I think none of them. Medical men know very well the more remedies they possess against a disease the more incurable it is. I do not assume to criti-



cise the different methods recommended for the destruction of the phylloxera, but their very number appears to me a proof that none of them has answered.

#### NECESSITY FOR THE ADOPTION OF NATURE'S RULES.

Let us follow the way nature has pointed out to us. First let us isolate the infected patches as much as possible. The subterranean phylloxera cannot spread when we do not prepare its way by plowing and weeding the vicinity.

Then let us favor as much as possible those insects, which we know feed on aphidians, especially the spiders; we must protect their webs. It is true they are not ornamental, but they are the most effective means to prevent the winged phylloxera from colonizing other parts of the vineyard.

I have to mention yet the ant as a friend and patron of leaf lice, which he keeps as cattle and colonizes them in his subterranean galleries. There is not a fact of this kind known in regard to phylloxera, but at any rate, the ant is a suspicious neighbor, and his hills have to be destroyed.

Till science has given us a destroying medium of quicker action, let us imitate and assist the slow but effective process begun by Nature, and whatever plan we adopt, let us act in concert.

## APPENDIX B.

## THE PHYLLOXERA-VASTATRIX.

[Illustrations obtained from Prof. C. V. Riley; text compiled from Prof. Riley's reports to the State of Missouri, and copied from the "Bushberg Catalogue."]

Among the insects injurious to the grapevine, none have ever attracted as much attention as the phylloxera, which, in its essential characteristics, was unknown when the first edition of this little work on American grapevines was written. The gall-inhabiting type of this insect, it is true, was noticed by our grape growers, many years ago (especially on the Clinton), but they knew nothing of its root-inhabiting type. Even Fuller—who informs us that in Mr. Grant's celebrated grape nurseries (as far back as 1858), the men were in the habit of combing out, with their fingers, the roots of young vines to be sent off, in order to get rid of the knots—never mentions anything of this, nor of any root-infesting insect, in his excellent Treatise on the Cultivation of the Native Grape, though sixteen pages are devoted to its insects. In the Spring of 1869, M. J. Lichtenstein, of Montpellier, first hazarded the opinion that the phylloxera, which was attracting so much attention in Europe, was identical with the American leaf-gall louse (first described by Dr. Asa Fitch, State Entomologist of New York, by the name of *Pemphigus vitifoliæ*); and in 1870, Prof. C. V. Riley succeeded in establishing the identity of their gall insect with ours, and also the identity of the gall and root-inhabiting types. The correctness of his views is confirmed by the subsequent researches of Prof. Planchon, Dr. Signoret, Balbiani, Cornu, and other scientists in France; lately, also of Prof. Rössler, in Klosterneuburg in Austria.\*

After visiting France in 1871, and then extending his observations here, some of which were made in our Bushberg vineyards, Prof. Riley first gave us every reason to believe "that the failure of the European vine (*v. Vinifera*) when planted here, the partial failure of many hybrids with the European *Vinifera*, and the deterioration of many of the more tender-rooted native varieties, are mainly owing to the injurious work of this insidious little root louse; also, that some of our native varieties enjoy relative immunity from the insects' attacks." M. Laliman, of Bordeaux, having previously noticed the remarkable resistance of certain American vines in the midst of European vines dying from the effects of phylloxera. The importance of these discoveries to grape culture cannot be too highly appreciated. The French Minister of Agriculture commissioned

\* While this is going to press we learn from Dr. A. Blankenhorn, Carlsruhe, Germany, that the phylloxera has just been found in three different places (Annaberg, Carlsruhe, and Worms), always on the roots of American vines, which, however, do not show the slightest symptom of disease.

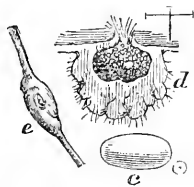
Professor Planchon, of Montpellier, to visit this country to study the insect here—the harm it does to our vines, or the power of resistance which these possess.\* His investigations not only corroborated Prof. Riley's conclusions regarding the phylloxera, but gave him, and through him to the people of Europe, a knowledge of the quality of our native grapes and wines, which will be very apt to dispel much of the prejudice against them that has so universally prevailed heretofore.

To discuss this subject as it deserves; to give a history of the grape phylloxera; the progress and extent of its ravages; the experiments made to prevent these; to review the influence which it had, and probably will have on American grape culture—would far exceed the scope of this brief manual. The literature of this subject will already fill a respectable library. We can here merely mention a few facts, and give some figures, which may enable the grape grower to recognize and to observe this minute, yet so important insect; and we refer those who desire full and reliable information to Professor Riley's Entomological Reports, especially the sixth, for 1874, from which we cull largely. It will be understood that all the figures are very highly magnified, and that the natural sizes are indicated by dots within circles, or by lines.

The following figure of a grape leaf, shows the galls or excrescences produced by the gall-inhabiting type of the insect. On carefully opening one of the galls, we find the mother louse diligently at work surrounding herself with pale yellow eggs, scarcely (.01) the one hundredth part of an inch long, and not quite half as thick. She is about .04 inch long, of a dull orange color, and looks not unlike an immature seed of the common purslane. The eggs begin to hatch, when six or eight days old, into active little beings, which differ from their mother in their brighter yellow color, more perfect legs, etc. Issuing from the mouth of the gall, these young lice



[Under side of Leaf covered with Galls.]

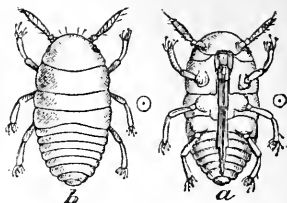


[TYPE GALLICOLA; c, egg; d, section of gall; e, swelling of tendril.]

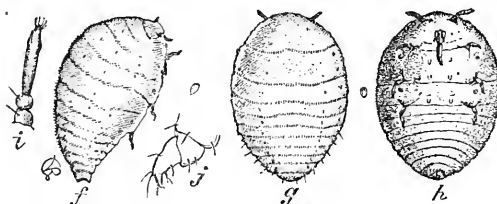
scatter over the vine, most of them finding their way to the tender terminal leaves, and commence pumping up and appropriating the sap, forming galls, and depositing eggs as their immediate parent had done before. This process continues during the Summer, until the fifth or sixth generation. Every egg brings forth a fertile female which soon becomes wonderfully prolific.

\* The full report of Prof. Planchon has just been published in the form of a most interesting little volume—"Les Vignes Americaines, leur résistance au Phylloxera et leur avenir en Europe." Paris, 1875.

By the end of September the galls are mostly deserted, and those which are left are usually infected with mildew, and eventually turn brown and decay. The young lice attach themselves to the roots, and thus hibernate. It is an important fact that the gall-inhabiting insect occurs only as an agamic and apterous female form. It is but a transient Summer state, not at all essential to the perpetuation of the species, and does, compared with the other, or root-inhabiting type, but trifling damage. It flourishes only on the *Riparia*, more especially on the Clinton and Taylor; a few of its galls have been noticed on some other varieties, and abortive attempts are often made to found them on others. And in some seasons it is even difficult to find a few galls on the very vines on which they were very abundant the year before.

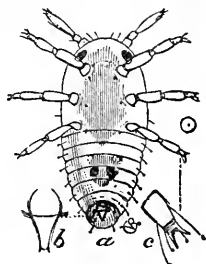


[NEWLY HATCHED LARVA; a, ventral; b, dorsal view.]



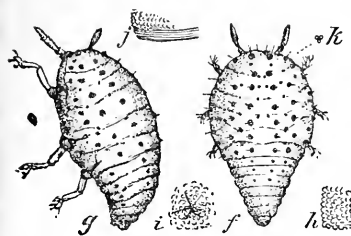
[MOTHER GALL-LOUSE; ventral and dorsal views.]

The root-inhabiting type of the grape phylloxera hibernates mostly as a young larva, attached to the roots, and so deepened in color as generally to be of a dull brassy brown, and therefore with difficulty perceived, as the roots are often of the same color. With the renewal of the vine growth in the Spring this larva moults, rapidly increases in size, and soon commences laying eggs. These eggs in due time give birth to young, which soon become virginal egg-laying mothers like the first, and like them, always remain wingless. Five or six generations of these egg-bearing mothers follow each other, when, about the middle of July, in the latitude of St. Louis, some of the individuals begin to acquire wings and continue to issue from the ground until vine growth ceases in the Fall. Having issued from the ground while in the pupa state, they rise in the air and spread to new vineyards, where they deliver themselves of their issue in the form of eggs, and then perish. In the course of a fortnight, these eggs, which are probably deposited in the crevices on the surface of the ground, near the base of the vine, produce the sexual individuals, which are born for no other purpose than the reproduction of their kind, and are without means of flight or of taking food. They are quite active and couple readily.



[MALE PHYLLOXERA; ventral view.]

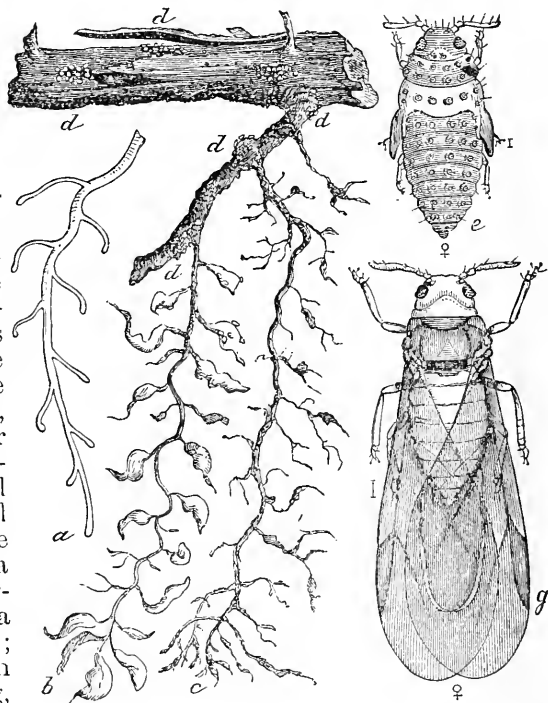
Every piece of root having rootlets, taken from an infected vine during August or September, will present a goodly proportion of pupæ, and a glass jar filled with such roots and tightly closed, will furnish daily, for some time, a dozen or more winged females, which gather on the side of the jar toward the light. We may gather some idea from this fact of the immense number that disperse through the air to new fields, from a single acre of infected vines in the course of the late Summer and Fall months. We have, therefore, the spec-



[TYPE RADICICOLA; showing the tubercles by which it is distinguished from *Gallitcola*]

If to the above account we add that occasionally individuals, under conditions, abandon their normal underground habit, and form galls upon the leaves of certain varieties of grapevines, we have, in a general way, the natural history of the species.

The annexed figure shows the abnormal swelling of the rootlets, which follows the puncture of the root-lice; they eventually rot, and the lice forsake them and betake themselves to fresh ones. As these decompose, the lice congregate on the larger parts beyond, until at last the root system literally wastes away.



[TYPE RADICICOLA:—*a*, shows a healthy root; *b*, one on which the lice are working, representing the knots and swellings caused by their punctures; *c*, a root that has been deserted by them, and where the rootlets have commenced to decay; *d, d, d*, shows how the lice are found on the larger roots; *e*, female pupa, dorsal view; *g*, winged female, dorsal view.]

As is frequently the case with injurious insects, the phylloxera shows a preference for and thrives best on certain species, and even discriminates between varieties, or what amounts to the same thing, practically, some species, or varieties, resist its attacks and enjoy a

relative immunity from its injuries. A knowledge of the relative susceptibility of different varieties to the attacks and injuries of the insect, is therefore of paramount importance. Information on this subject, based on the researches of Professor Riley, in addition to careful observation and experiments, made during the last four years by ourselves and our many correspondents in France and in this country, are contained in this catalogue, both in the "Description of Varieties" and in the notes to Dr. Engelmann's "Classification of Species." (Pages 4-12.)

The reason why certain vines thus enjoy exemption while others so readily succumb, cannot be fully ascertained, but in a broad way it may be stated that there is a relation between the susceptibility of the vine and the character of its roots—the slow-growing, more tender-wooded, and consequently tender-rooted varieties succumbing the most readily.

We see in the general resistibility of our purely native American vines against the phylloxera, a remarkable verification of that law which Darwin has so ably established and aphoristically expressed, as "the survival of the fittest."

Professor Riley, in explaining "Why the insect is more injurious in Europe than here," says: "There exists a certain harmony between the indigenous fauna and flora of a country; and our native vines are such as, from their inherent peculiarities, have best withstood the attacks of the insect. The European vine, on the contrary, succumbs more readily, not only because of its more tender and delicate nature, but because it has not been accustomed to the disease—there being, doubtless, a parallel between this case and the well-known fact that diseases and parasites which are comparatively harmless among peoples long accustomed to them, become virulent and often fatal when first introduced among hitherto uncontaminated peoples. Then the particular natural enemies of the insect which belong to its own class, and which in this country help to keep it within due bounds, are lacking in Europe; and it will require some time before the closely allied European predaceous species will prey upon and check it there to the same extent. The phylloxera will also, all other things being equal, have an advantage in those countries where the mildness and shortness of the Winter allow an increase in the annual number of its generations. Finally, the differences in soil and in modes of culture have no insignificant bearing on the question in hand. Though phylloxera, in both types, is found on our wild vines, it is very doubtful if such wild vines in a state of nature are ever killed by it. With their far-reaching arms embracing shrub and tree, their climbing habit unchecked by the pruner's knife, these vines have a corresponding length and depth of root, which render them less susceptible to injury from an underground enemy. Our own method of growing them on trellis approaches more nearly these natural conditions than that employed in the ravaged French districts, where the vines are grown in greater proximity and allowed to trail upon the ground, or are supported to a single stake."

Again, after speaking of the large numbers of winged females rising from the ground during late Summer and Fall, he adds the following cogent reason in a recent number of the New York Tribune: "The winged female phylloxera is wafted about, and will lay her eggs, or, in other words, deliver herself of her progeny,

wherever she happens to settle. If this be upon the grapevine, well and good, the young live and propagate; if upon other plants, they perish. We thus have the spectacle of a species annually wasting itself to a greater or less extent, just as in the vegetable kingdom most species produce a superabundance of seed, the larger portion of which is destined to perish. Thus in the thickly planted vine districts of France few winged insects would fail to settle where their issue could survive, while in America an immense number annually perish in the large tracts of other vegetation intervening between our vineyards."

## APPENDIX C.

## THE PHYLLOXERA-VASTATRIX AND ITS RAVAGES IN SONOMA VALLEY.

BY H. APPLETON.

SONOMA, August 28, 1880.

On the nineteenth of August, 1873, an insect was found on the roots of grapevines by H. Appleton and O. W. Craig, in the vineyard of the latter, situated two miles north from Sonoma Town, on the west side of Sonoma Creek.

Samples of these roots were brought to the notice of the Vinicultural Society, at a meeting held in Sonoma, August 23, 1873, and the following extracts taken from the minutes of the club show what action they took on the subject:

CLUB ROOM, August 23, 1873.

Mr. A. F. Haraszthy stated that within the last few days an insect, supposed to be the phylloxera-vastatrix, had been found upon the roots of vines in Sonoma Valley. That he had known of vines manifesting every symptom of the disease, as described, for many years in Sonoma Valley; that the spread was but slow, and that young vines planted in the place of those that had died seemed to do well, and be free from any disease.

On motion, duly made, seconded, and passed, a committee, consisting of William McPherson Hill, A. F. Haraszthy, O. W. Craig, and A. S. Edwards, was appointed by the Chair to visit such vineyards in Sonoma Valley as they deemed necessary, to fully ascertain whether the said insect could be found, and also obtain all information possible in relation thereto, and all members of the club were particularly requested to furnish to said committee all the information they possessed, and every facility in their power, for the thorough investigation of the alleged presence and mode of attack of said insect.

The thanks of the club were extended to Mr. Appleton for information concerning the attack of said insect, and use of his microscope, and he was requested to have the kindness to act with the club committee in their examination of the vineyards in Sonoma Valley.

At the next meeting of the club, held August 30, the following report of said committee was made:

The committee heretofore appointed to investigate the alleged attack of an insect supposed to be the phylloxera-vastatrix, by their Chairman, William McPherson Hill, made a lengthy report of their examination of various vineyards in Sonoma Valley, which report was received, adopted, and ordered to be placed on file, and the said committee were requested to continue their investigation and report from time to time as to any matter of interest that might be learned.

The Secretary was directed to correspond with Professor C. V. Riley, State Entomologist of the State of Missouri, upon the subject, and to send any specimens of the insect, as found here, with such explanations as to its modes of attack, etc., as he may be able to do.

The following is the report of the committee:

*To the President of the Sonoma Vinicultural Club:*

The undersigned, a committee appointed Saturday, August 23d, to make investigations as concerning an insect which it is said has lately been discovered on the roots of the vines in Sonoma Valley, respectfully submit the following report:

That they have visited and carefully examined, as far as their limited time and means would admit, those vineyards where it was said the insect had been found, as also other vineyards where there was reason to suspect, from external signs, its presence, and have come to the unwelcome conclusion, and do hereby report, that in their opinion an insect, or louse, has been found upon the roots of our vines in California, which is doing great mischief and threatening to work the most serious consequences to the vineyard interest; that, without giving it as our positive opinion, there is strong reason to believe that it is the same insect which has, within



the last few years, been discovered in the vineyards of Europe and the United States, where it has committed fearful ravages, and engaged the serious apprehension of the French and German governments, as well as of all friends of the vine interest. The insect, or louse, is known in Europe by the title of *phylloxera-vastatrix*, and in the United States as *pemphigus vitifoliae*.

In the opinion of Professor Riley, the distinguished entomologist of Missouri, it is one and the same insect. The committee do not desire to speak positively on this head, as to the identity of the root louse we find in Sonoma and the *phylloxera-vastatrix*.

While there is strong resemblance between the insect here, as seen under the microscope, and the cut of the European, as shown in the Patent report of 1870 and 1871, yet it still may be a disputed question as to the identity.

According to the account of the *phylloxera-vastatrix*, as published in the Patent Office report, in speaking of its habits, it would appear the great depredations are committed on the leaf of the vine, that through the growing season it lives above the ground in the foliage, and returns to the roots only after the leaves are exhausted and decayed, and remains in a torpid state during the Winter, and when warmed into life and action by warmth of the Spring suns, makes again its appearance above ground, attacks the young leaf, makes a harbor for itself on the leaf, deposits its eggs, propagates itself at a fearful rate, spreading over and destroying the foliage, after which it returns again to feed on the sap of the root. Your committee do not find this the habit of the insect which we have examined here. We do not discover in any instance the insect in any form above ground, although the present may be said to be the growing season.

We do not find the symptoms published, on the leaves of the vines affected, but in all cases the working of the pest appears to be confined to the root only. It would be an interesting point to know whether climate has any influence over the insect in this respect.

The committee therefore suggest a more careful investigation before the club shall decide that the *phylloxera-vastatrix* or the gall louse of Europe and the United States, is really at work on the vineyards of California.

Where this insect originated, or in what particular vineyard in Sonoma Valley it first made its appearance, it is impossible for your committee to say. One fact is clear to the committee, that for a number of years, at least ten, in certain localities there have been vines showing *all* the symptoms of disease, decay, and debility, which are exhibited by those vines affected by the present insect. These external signs are the yellow leaf, short stunted growth, dead roots, and general death.

It may be said that these are almost invariably the signs of diseased or debilitated vines, no matter what the cause, so that such symptoms are by no means special to the presence and operations of the root louse, but it may be said as a certain fact, that wherever we have found the louse, the symptoms mentioned invariably present themselves, if not upon the vine itself, still upon some surrounding vines. In many cases the louse was found upon vines apparently healthy, the growth strong, and the foliage rich and green, but always in such cases there would be vines close at hand exhibiting the above symptoms; the insect appears to have deserted the dying vines, and sought the neighboring ones in search of fresh supply of food.

The question has suggested itself to the committee, whether the insect is not the result of debility or disease in the vine, rather than the cause of the disease, and whether this may not be a parasite growing out of the decaying system of the vine. The argument of this point would require more space than is consistent with the limited extent of this report.

Whether the cause may be owing to bad culture, over bearing, want of drainage, late or bad pruning, drought, or some one of the many surroundings of vine culture, your committee at this time will not consider. All these matters are submitted by us as deserving the serious consideration of the club.

Upon the subject of prevention or remedy of the scourge, your committee will hesitate to give advice. The deepest research (stimulated by enormous rewards) of the most scientific entomologists of the world, have failed to discover anything up to this time, to save from threatened ruin and destruction this great national interest.

There are many considerations that might properly be brought within the compass of this report, but the committee have thought best to leave further action to the club, and in conclusion would beg to urge the serious consideration of the club to the subject.

All of which is respectfully submitted.

SONOMA, August 30, 1873.

A. S. EDWARDS,  
WM. McPHERSON HILL,  
O. W. CRAIG,  
A. F. HARASZTHY.

The vineyards that this committee examined, where the insect was found, were those belonging to Messrs. Gauss, Wholler, Goss, Edwards, Maxwell, General Vallejo, Buena Vista, and A. F. Haraszthy. These vineyards extended for about eight miles north and south, and across the valley nearly two miles. Particulars of these points of attack will be given in the history of individual vineyards.

Vineyards examined by said committee where the insect was not

found, were those of Messrs. Hill, Stewart, Gundlach, and Dressel. At that time the phylloxera was known to be in the vineyards of Messrs. Craig, Appleton, and Major Snyder.

In searching further the minutes of the Vinicultural Club, I find the following on this subject:

JANUARY 3, 1874.

The letter from Professor Riley, State Entomologist of the State of Missouri, to whom were sent specimens of the insect found upon the roots of grapevines in Sonoma Valley, and supposed to be the phylloxera-vastatrix, acknowledging their receipt, but stating that they did not arrive in good order, and that he was unable to find any of the insects, and wishing further specimens to be sent, was read.

Members of the club were requested to make careful search for further specimens, and to deliver the same to the Secretary, who was instructed to forward the same to Professor Riley. And at a meeting held by the club, July 11, 1874, the following extract is taken: "The Phylloxera Committee were called upon for a report, and Mr. Hill, as Chairman, stated he had no written report to present, but that he was well satisfied that the insect was, and had been in our valley for many years, as heretofore reported, and that he saw evidence sufficient to satisfy him that they were still at work in various localities; that as yet no practical remedy or prevention had been discovered; that the best minds of all grape-producing countries had been directed to the study of its habits in the endeavor to find out remedies and preventives; that as yet the insect had not made much progress in our valley."

Mr. Haraszthy reported that from December to May last, he had taken up between eight and ten thousand grapevines, and had carefully examined a great many of them, but found none (insects) alive, but plenty of indications that they had been upon the roots; that he thinks the severe frosts of the past two years have had much to do with the sickly appearance and death of the vines; that in many places he has found little vines entirely killed by the frost, and large ones sometimes killed near the ground, which, when cut off, sprouted again and looked healthy; that as early as 1860, at the Buena Vista Vineyard, he found vines, from time to time, dying, but they attributed their sickness and death to alkali, which they had found to be quite strong in the subsoil.

FEBRUARY 19, 1876.

Mr. Snyder moved that a committee be appointed to acquaint the Legislature (by means of petition, etc.) of the ravages of the phylloxera, and demand from it that some remedies and materials be forthcoming, so that a series of experiments may be inaugurated. Carried.

From information received from Mr. A. F. Haraszthy and Captain E. Cutter, Superintendent of the Buena Vista Company's vineyards, I am able to give the following facts in regard to their large vineyards:

A vineyard of about one thousand vines was planted in 1834-35, and was watered every year. In 1850 and 1852 the vineyard was largely increased, and the system of irrigation was stopped. In 1857 about two hundred thousand vines were set out, and in 1858 one hundred acres were put in vines (six hundred and eighty vines to the acre). Again, in 1860, fifty acres were laid out. In 1862, Colonel A. Haraszthy planted seventy thousand European vines, and it was among these vines the disease increased most rapidly.

In the Spring of 1863 the Buena Vista Company was incorporated, and in the Spring of 1864 that company planted one hundred thousand vines.

As early as 1860 decayed and dying vines were noticed in the vineyard, and they were taken up and others planted in their places. An examination was made to discover the cause of the disease in these vines, and it was attributed to alkali water, which was found a few feet under ground. The roots were decayed. No examination by microscope of these roots was made. Vines died from time to time, showing short growth, small and colorless grapes, early yellow leaves—in fact all the symptoms were observed of vines dying from the vine pest.

In 1868 about three acres of diseased vines were taken up (planted in 1850) on the north side of the dwelling house, and new vines planted, which grew well, showing little signs of decay till they were

four years old, at which time (1873) the Phylloxera Committee of the Vinicultural Club found the phylloxera on several vines. During the past five years the Buena Vista Company have inaugurated a system of examinations in the endeavor to destroy the phylloxera. These experiments were made in most cases very thoroughly, extending over from ten to one thousand five hundred vines, at a cost of two thousand five hundred dollars in labor and material to the company. The most of these experiments were useless, and none of them gave general satisfaction in their results.

Bisulphide of carbon was thoroughly used for a number of years. In 1875 and '76, four hundred vines were put under the influence of this chemical, forced under ground by a hollow tube and plunger, with three or four insertions around each vine. Experiments with bisulphide of carbon have been followed up to the present time; as many as one thousand five hundred vines were under its influence at one time.

The company also tried coal tar, coal oil, coal tar and gas lime mixed, carbolic acid, concentrated glycerine, bisulphide of carbon and manure mixed, sulphuric acid and water; J. O. Weatherby's remedy, guano; Hoffman's remedy; Dr. E. J. Fraser's remedy; liquid from tanned skins; liquid from cow and other manure; Des cubes rohart; whale oil and copperas, etc.

Planting corn near diseased vines was tried, and the fact was established that the phylloxera was found in large quantities on the roots of the corn, and the vines seemed to recuperate under its influence.

Examinations were made and the insect found on the roots six feet under ground. Vines were taken up, and the cuttings planted died the next year, and were followed by rooted vines which showed signs of disease when one year old.

A. S. Edwards' vineyard (commonly known as Butler's vineyard) of eighty acres, had dead vines in it during 1871-72, and in 1873 the Phylloxera Committee found the insect in a number of places. These infected vines were heavily manured for a number of years without staying the ravages of the insect. In 1876 the whole of this vineyard was abandoned, and has not been plowed or pruned since.

It was noticed that there was a check in the death of vines after it was abandoned. It is thought by many that this was caused by the hard ground preventing the insect spreading to healthy vines.

Many costly experiments have been tried in different parts of the valley, but as they did not accomplish the object desired, I need not mention them here.

The knowledge of the fact, that, with the expenditure of large sums of money, the most scientific minds of Europe, in their extensive research and experiments, have failed to discover *any practicable* method of destroying the phylloxera, has discouraged our vintners from attempting further experiments. We look to the State Commission on vine pests for enlightenment: first, as to those experiments in France which have proved failures, that we may not waste our time and money in repeating them; secondly, as to what remedies have been most successful, that we may continue to work in those directions; and we still hope that the combined research of all parties interested will result in final success.

Respectfully,

H. APPLETON.

## APPENDIX D.

## HISTORY OF THE ORLEANS HILLS VINEYARD AND ITS DISEASES.

BY J. KNAUTH.

SACRAMENTO, CAL., 1880.

In 1853 I imported from Nassau on the Rhine, in Germany, fifteen varieties of grapevine cuttings. They arrived in good order, and were first planted in my garden near Sutter's Fort. They flourished splendidly, and were largely propagated while showing not a single trace of any sort of disease. In the Winter of 1859-60 I established the Orleans Hills Vineyard in Cache Creek Cañon, and so named it from the Orleans grape, which then so largely predominated. Most of the vines forming the new vineyard were those taken up from my garden and transplanted in Cache Creek Cañon. In fact, none others were procured or planted by me at that time. Some few thousand vines were planted on the low land, or what was still better, just at the rise of the hill. Where the soil was of a stiff, clayey nature the vines did not flourish so well as those on the hill, where the soil was more loose and chalky. This was particularly noticeable with those vines having naturally tender roots, for they were left behind and continued to stay behind. Removing and replanting for several years did not do any good, and finally I abandoned that kind of work on that part of the ground, and in a few years there were but few alive except the strong-rooted ones, and they seemed sickly because of the death of their late companions. However, this sickening of the vines continued, and was slowly crawling up the hill, showing itself more plainly in the lower parts of the undulating ground where the soil was heavier.

I dug up several plants and examined their roots with a powerful glass, finding many of the roots formed into something like knots, and giving conclusive proof that something had been doing damage. I also found several small insects, familiar to me, but not being in the habit of looking for lice, I did not find the phylloxera, or, if I did, I failed to recognize them. What were noticed, however, were numbers of small ants of a whitish color on every vine which was dug up. What were they doing there? They never go where there is nothing to be harvested. It is well known that the larger kinds of ants will clean off, as clean as a pin, blankets or other material infected with parasites of any kind, and why may they not prove a remedy for the phylloxera. These ants do nothing but good, and in our vineyards they should be protected rather than destroyed.

Some vines, the Zinfandel for instance, were bought, I think in Napa, for the Orleans Hills Viticultural Association, but they were planted some time after the first establishment of the Orleans Vineyard.

J. KNAUTH.

N. B.—Professor Behr shows that the ant follows the aphid to milk it; hence Mr. Knauth is probably wrong in supposing it to be the enemy of the phylloxera aphid.—COMMITTEE.

## APPENDIX E.

## CARBON-BISULPHIDE FOR THE PHYLLOXERA.

BY JOHN H. WHEELER.

There have arisen of late many arguments in favor of the manufacture of carbon-bisulphide on the Pacific Coast, and it is pursuant to the advice of the Viticultural Commission and to that of Professor Hilgard, of the University of California, that its manufacture is now begun. Professor Hilgard has for some time urged strenuously upon the people the necessity of the reagent as well for vermin, squirrels, etc., as a remedy for phylloxera. Now that the work has actually begun, much is being done to bring it before the public. The St. Helena wine-growers, on November 6th, passed a resolution to recommend the bisulphide as the best known remedy for phylloxera, approved of the author's investigations, and pledged him encouragement by every means in their power. Other encouragement has been given, and the scheme has so far met with general approval.

The further one goes into the study of the bisulphide the more favorable it seems as an insecticide. To the chemist, its superiority is immediately apparent. As a poison, the vapor acts immediately upon small animals, vermin and insects generally, but the larger animals it affects but little. Used as a liquid it immediately turns to vapor, which, by virtue of its great specific gravity, sinks immediately to the desired spot. Its strong odor serves many useful purposes—a warning to prevent its explosion or excessive inhalation. It has resisted practical proof during five years past; it is cheap, and contains one of the ingredients found in nearly all proposed insecticides, viz.: sulphur, and it seems to fill the requirements most admirably.

The materials from which carbon-bisulphide is made are sulphur and carbon in some available form; the main principle of their combination is simple, but owing to the poisonous nature of its vapors, and to the easy volatility of the liquids, together with its explosibility, there arises considerable expense incident to the condensing, storing, and transportation. It is stored and transported in heavy iron barrels, the expense of which becomes considerable—in consequence, it is impracticable to import the bisulphide; it must be made here. The location of the works is at West Berkeley, at a point convenient for shipping by water or rail to all parts of the State. These works will begin on the thirteenth of December, producing twelve thousand pounds per month. This large capacity is chosen to lessen the price, for with this quantity a great economy of fuel, labor, and sulphur is effected. It is not expected that this quantity will at first be used monthly, but to effect the above economy this factory will not run continuously. From this point the bisulphide is to be delivered free on board cars or boat at eight cents per pound; this rate is to apply only where a quantity is taken sufficient to supply

half-acre vineyards, or of greater extent, viz.: one hundred and forty-two pounds or more; for squirrels and experimental work, twelve cents per pound will be charged to pay for immediate handling and vessels used. Now, making our estimate on this according to directions for use, as deduced by the French, we have the following as the cost of carbon-bisulphide: Thirty-two grammes per square meter, the greatest amount necessary, if divided between two applications, to totally extinguish the phylloxera, is equivalent to two hundred and eighty-five pounds per acre; this, at eight cents per pound, makes a cost of twenty-two dollars and eighty cents; or, again reckoning for each vine, supposing our vines six and one half feet apart each way, which makes about one thousand vines per acre, we have per vine 4.56 oz. at eight cents per pound, which makes a cost of twenty-two and eight tenths cents per vine. It must be borne in mind, that although we have made an estimate per vine, the vapor is not to surround the vine only, but to completely fill the whole body of the soil between the vines, as well as at its tap roots, in order that not one of the insects shall escape its effect. For vines at different distances apart, different rules must be observed for dividing up the quantity per acre, which, therefore, when determined by the Commission or experiment, will be tabulated and go with the directions which accompany each barrel. The smaller expenses I have not entered into here, they being so inconsiderable and differing in different localities. The price has varied in San Francisco between thirty-six and sixty cents per pound. The lowest at which it can be purchased here now is twenty-eight cents per pound. The lowest figures I have been able to get is from Eastern chemists, who furnish bisulphide at nine cents per pound; adding to this eighteen dollars per one thousand pounds for the iron drums in which it is transported; and a heavy cost of transportation, and we are precluded from its use unless manufactured here. The means adopted in our manufactory of selling the bisulphide will be identical with those in France, viz.: on ordering a lot, a deposit will be made as security for the barrel, which, on return of the barrel in good condition, will be refunded to the purchaser, thus saving the consumer the expense of the vessel.

Regarding the instrument with which the bisulphide is injected, the latest improvement used in France will be had, a sample of which is expected daily. The cost of the injector is, in France, eight dollars. A slight advance on this will be the cost in California. It is proposed to keep constantly on hand, at the manufactory at Berkeley, a supply of injectors, to be sold or rented. The injector consists of a steel tube, pointed at its lower end and attached to a zinc tank above. The whole is of a convenient length, and has a cross-piece for a handle above the tank. Below the tank, and attached to the steel tube, is a projection on which to apply foot power in inserting the instrument into the ground. When arriving at the proper depth, a button on top is struck sharply with the hand, which, by means of an arrangement within, forces out from the bottom end of the steel tube the amount required for each injection. Care is required in the filling and use of this instrument, but any ordinary workman can manipulate it without trouble. The work is done very rapidly, two men being required, one to use the injector and the other a tamper, which is an iron bar with a heavy end, by which the hole made by the injector is choked or sealed up. These two men make three

hundred injections per hour, and require three days to do one acre of vineyard.

With the object in view of preparing the bisulphide for phylloxera, it has become my province to investigate the application of the insecticide. To do this, I have made a thorough study of the leading authors among the French, who, having had the largest experience with both the insect and its remedy, seem most competent to instruct. The work of the Comité Regional, instituted under the auspices of the Compagnie de Chemin de Fer de Paris à Lyon et à Méditerranée, has been my special study—the result of which I endeavored to present to the public by a series of articles published in the Pacific Rural Press, beginning with October 23d. Articles have been published by me in various other papers, from time to time, as I found new and valuable matter to add to the first. With this knowledge of the use of bisulphide, and with the interest I have in the viticultural industry of California, being myself a member of the St. Helena Vine Growers, I shall make it a point to pursue the dreaded phylloxera to the very utmost. Much depends on the accuracy with which the directions in all particulars are complied with. It therefore becomes my special aim to see that the first use of the insecticide is made correctly. Ever following the dictation and advice of the Commission, I hope we may, after a fair trial, say, with Professor Marion, Professor of the Faculty of Sciences of Marseilles, and Member of the Superior Phylloxera Commission, that “we are in possession of a complete and efficacious remedy for the unwelcome phylloxera.” About the 15th of December the first application of bisulphide will be made in Mr. Weinberger’s vineyard, near St. Helena. A number of other places have been spoken for, and from these I propose to make a complete canvass of the phylloxerated districts, to operate on all those vineyards where the remedy seems acceptable. Regarding the best time for the application, the French use the Winter months mostly; but this may vary, and will be directed by the Commission and experience.

Very respectfully,

JOHN H. WHEELER.

## APPENDIX F.

## INSTRUCTIONS OF THE PARIS-LYONS AND MEDITERRANEAN RAILROAD COMPANY, FOR THE TREATMENT OF VINES WITH BISULPHIDE OF CARBON.

[Translated from the French by Miss Anna Louise Wetmore.]

## I.

## PRECAUTIONS IN THE EMPLOYMENT OF BISULPHIDE OF CARBON.

Whatever may be the dangers that can result from using the bisulphide of carbon, they are certainly not of a nature to exclude this powerful insecticide from viticulture. It is sufficient to call to mind that during the whole season of 1877, in the course of which great quantities of bisulphide of carbon circulated over the entire network of the company, and were delivered into the hands of so great a number of workmen, not one serious accident occurred. It is just to attribute that favorable result to the careful instructions prescribed last year, instructions which it is expedient to reproduce here.

Bisulphide of carbon ignites with the greatest facility. The vapors which it evolves, even at an ordinary temperature, are dangerous to inhale. Their quantity augments rapidly with the heat, and, moreover, they form with the air an explosive compound, like those of petroleum, of alcohol, and like illuminating gas. To protect one's self from accidents which these dangerous properties may entail, the following precautions are indispensable, and cannot be too highly recommended to the attention of viticulturists. The care required for the management and use of the cask forms the subject of special instructions, which will be forwarded with each cask. The workmen charged with the management of the bisulphide of carbon, ought, in every case, either at work or in proximity to the apparatus and the casks, to keep themselves as much as possible protected from the emanations, and to abstain expressly from smoking. It is necessary for them to understand clearly that the vapors extend far out, and that a spark would be sufficient to cause a formidable explosion.

Moreover, the injecting apparatus must be filled directly at the faucet of the cask, and no one should be permitted to carry the sulphide of carbon away in any other way. If, for the treatment of a distant vineyard, it were deemed proper to intrust the cask to the workmen, it would be indispensable to conform strictly to the directions given in the special instruction concerning the use of the cask. It may happen that an injecting apparatus being out of order, needs to be soldered. It is necessary to see, before bringing fire near that instrument, that it does not contain in its interior a vestige of the vapors of sulphide of carbon. The injector should be completely filled with water, then emptied, and left open to the air for some time.



## PRINCIPLES OF THE TREATMENT OF PHYLLOXERATED VINES.

Studies made during the year 1876 led to recommending successive applications of bisulphide of carbon in the months of April, June, September, October, and November.

Experience had proved that a single injection sufficed, in many cases, to arrest the action of the parasites of the vine, and to bring about a perceptible improvement in the vegetation; but it was evident, on the other hand, that the underground colonies of phylloxera multiplied themselves anew in proportion to the quantity of insects spared by the insecticide, to a degree that it became necessary to check this new attack by the subsequent treatments. These four treatments thus distributed through the year, cannot be precisely carried into effect in all viticultural regions. For example, in 1877, in the greater part of the fields in the south of France, the applications of Summer and Autumn, on account of an excessive drought, met with insurmountable difficulties.

The agricultural work of these two seasons raised the price of hand labor very much. The scientific studies instigated by the company come happily to prove that these treatments are most indispensable.

Two operations only are absolutely necessary to the viticulturists:  
*First*—It is necessary to destroy the young hibernating phylloxeras which, established on the roots, perpetuate from one year to another the underground colonies.

*Second*—It is expedient to arrest the multiplication of the insects of the new generation, which, in the second half of the month of May, descends from the stems to the roots, and occasionally appear in new spots.

Consequently, two treatments must be recommended—the first in the course of Winter, or at the beginning of Spring; the second during the last week of May and the month of June. It is well understood that this last may be, if necessary, continued into Summer, until the season or the resistance of the soil arrests the operations.

As to the first applications, it is well not to make them at the time when the new growth of the vine is beginning, as it might be impeded by the vapors of the sulphide of carbon. These treatments, to be complete, should be in separate doses, that is to say, each should comprise two successive injections, with an interval of six days in Winter, and only four days in Spring. In each operation only about fifteen grammes of sulphide of carbon to the square metre should be injected. (See the special instructions for the distribution of that quantity of sulphide.)

In thus applying twice a dose of thirty grammes of bisulphide of carbon, an insecticidal effect, much more complete than by injecting the same dose in a single operation, will be obtained.

This result has been clearly proved by the special experiments recorded in the general report published by the company. The method of repetition realizes a true economy of sulphide, which can be easily accounted for, if we consider that the maximum treatment requires only the annual employment of sixty grammes of sulphide to the square metre, whereas the four separate operations involve an outlay of from eighty to a hundred grammes, without producing as complete results. This new method is not based only upon the experiments of the laboratory, it is based equally upon extensive practical culture.

The maximum treatment, such as has just been explained, applies more specially to vineyards in which is proposed as complete a destruction as possible of the parasite. Viticulturists will understand that it is easy for them to combine the moderate treatments according to the different circumstances of the case. They will obtain satisfactory results with a repeated treatment in Winter, followed by a simple application made in June, at the rate of twenty-five grammes to the square metre. They may, furthermore, confine themselves, in Winter as in June, to making repeated applications in the badly affected spots, and a single treatment in the parts slightly affected.

In all cases, when the operation is performed in Spring, it is well to commence in the center of the affected spots, so that if the work is hindered by drought, the parts most phylloxerated may not remain without treatment.

#### INSTRUCTIONS FOR THE TREATMENT OF THE VINE.

It has been said already that it is sufficient to apply suitable doses of bisulphide of carbon to the phylloxerated vines, to see vegetation very soon recover its vigor. As soon as the number of underground pucerons is sensibly diminished, the roots produce new fibers, the functions of which soon furnish the plant with the elements of repair. It is understood that this phenomenon will be more or less rapid, according to the physical condition of the plant, and that it will always show itself in direct connection with the effect of the sulphide on the parasites.

The treatments stated above are assuredly of a nature to check and even to annihilate the action of the pucerons, by destroying their colonies; but their results will be much more perfect if, in the mean time, a suitable manure is used.

In one of the fields of experiments of the company, at Cap-Pinède (Marseilles), the rapid regeneration of old vines, which had not yielded any harvests for several years, under the influence of the bisulphide of carbon, and of a nitrogenous and potash manure, developed superb canes, and yielded fruit again from the first year of treatment. It would be expedient to add to the ordinary nitrogenous manure a salt of potash, similar to the chloride of potassium of commerce.

The dose to be used for each vine is about twenty grammes, so that one kilogramme should be enough for fifty vines. The chloride of potassium should be mixed with a manure, or in default of a manure, with a certain quantity of earth, and be applied around the foot of the vine.

It may be advantageous in certain cases, to resort to chemical manures, composed according to rules known to agriculturists, and containing at the same time ammonia, phosphoric acid, and chloride of potassium. Viticulturists, however, will choose the method of manuring according to their convenience. It is sufficient to point out to them the importance of this agricultural operation.

Perhaps some may wish to apply the manure to the vine at the time for top-dressing. It is important in every case not to stir up the soil previous to the injections of bisulphide of carbon, and not to commence cultivation until at least fifteen days after the treatment. Experiments have proved that the vapors of sulphide of car-

bon do not last as long nor act so well in loosened earth as in compact soil. Therefore, it is equally important to compactly close the holes made for the injection. This last recommendation cannot be too much insisted upon.

## II.

### INJECTION ACCORDING TO THE DIFFERENT SYSTEMS OF CULTURE.

Observation proves that the roots always reach from one plant to another, so that not a single part of the vineyard can be considered as free from the phylloxera. It is therefore necessary, to obtain complete insecticidal effects, to introduce the sulphide of carbon into the soil, in such a way that the distribution of the vapors may be as uniform as possible. To realize this condition, it is necessary to arrange the holes for the injection by first taking account of the surface of the field. Thus, when it is a question of twenty or twenty-five grammes of sulphide of carbon, it is necessary to assign them to each square metre and not to each plant.

In the adjoining tables will be found figures indicating how, according to each method of planting, a sufficiently regular distribution may be obtained. In order to conform to the prescriptions contained in these tables, it is necessary for the workmen to introduce the rod of the injecting instrument, as much as possible, vertically in the ground, and in places corresponding to those designated in the annexed diagrams. It is evident that the distribution of the sulphide would be modified, if the apparatus was inserted obliquely, sometimes in one direction, sometimes in another. One should always endeavor to make the rod of the injector penetrate as deeply as possible.

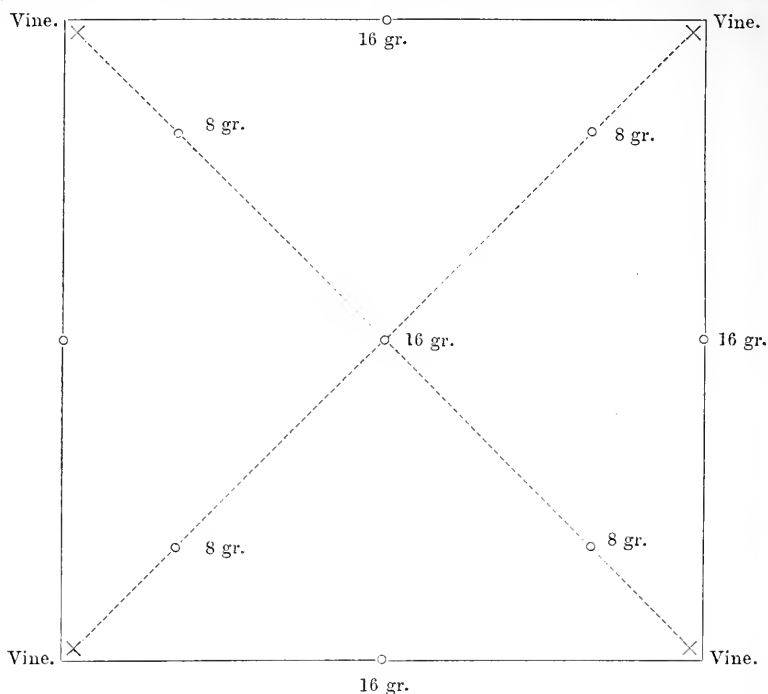
It is necessary to remark that the doses indicated in the table have been calculated for fields, the plants of which being still insufficiently vigorous, may endure an abundance of the vapors of bisulphide of carbon.

The resistance of vines to the action of bisulphide of carbon is assuredly much greater than one would think at first; it is certainly beneficial, if the plants one proposes to treat are already very weak and present but few roots, or if one is operating on very young vines, not to come up to doses of twenty-five grammes per square metre for the simple treatments, and of thirty grammes for the repeated treatments.

### ILLUSTRATIONS OF METHOD OF TREATMENT.

NOTE.—The illustrations given by the P. L. & M. R. Co., are for vines planted at distances of one, one and one half, and two metres apart. As our California vineyards are not planted generally with less distance apart than two metres (six and one fourth feet), we shall copy only the methods applicable to such distances of two metres.—TRANSLATOR.

## FOR PLANTATIONS TWO METRES APART—FIRST MODE OF TREATMENT.



## INSTRUCTIONS.

Surface occupied by each vine, four square metres.

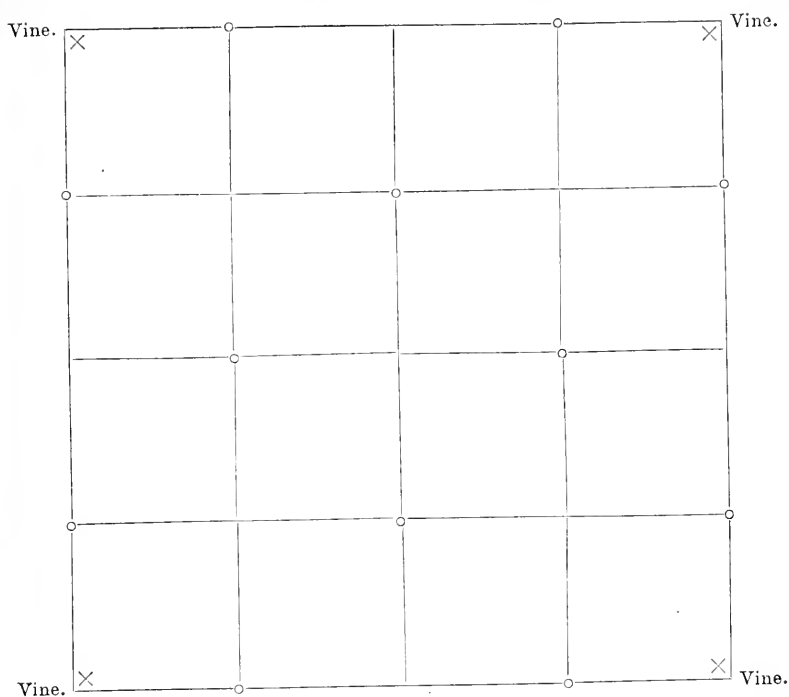
*Injecting Holes* (marked o)—First series on diagonal lines forty one hundredths of a metre from the vine; second series on the lines of the squares, one metre from the vines; third series, one hole at the intersections of the diagonals.

## DOSES TO BE APPLIED.

*For One Simple Treatment*—Eight grammes for the holes on the diagonals, excepting at the intersection; sixteen grammes for the others.

*For Repeated Doses*—Five grammes for the first and ten grammes for the latter.

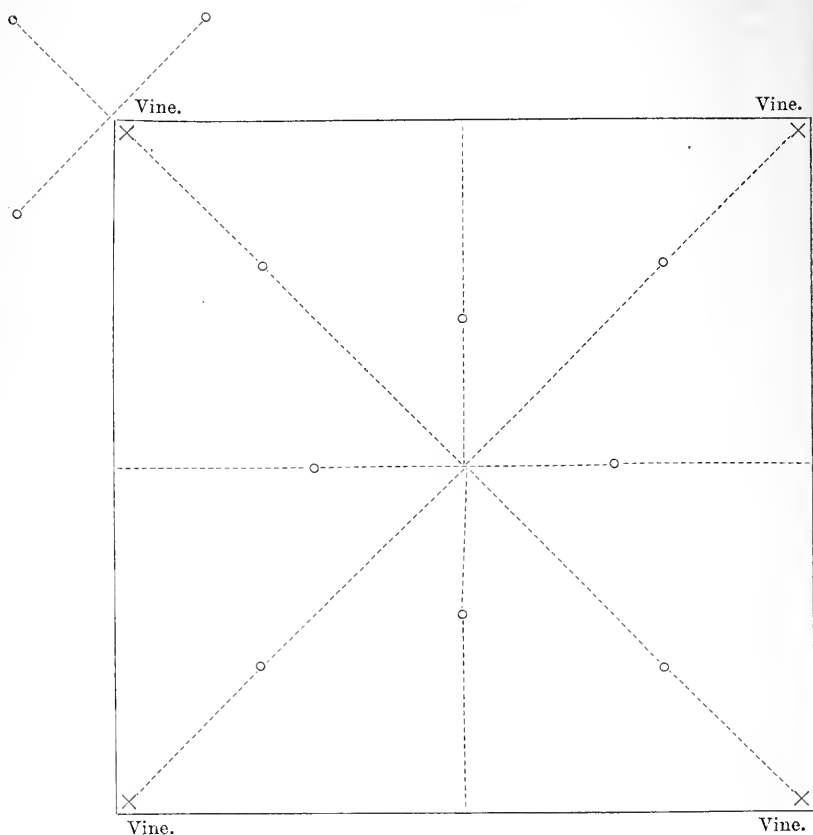
## SECOND MODE OF TREATMENT.



Holes made half a metre from the vines at right angles and at one metre apart on the lines parallel with the vines.

*Doses*—For simple applications, twelve grammes to each hole; for repeated doses, eight grammes.

## THIRD MODE OF TREATMENT.



*Holes*—Four placed forty one hundredths of a metre diagonally from the vines; four placed on the parallels to the vines, each half a metre from the center. Same doses as in the second mode.

## III.

## DESCRIPTION OF THE GASTINE POINTED INJECTOR.

The pointed injector for bisulphide of carbon is a kind of compression pump of a special form, inserted in the axis of an iron tube serving for a stake. The end of the instrument is of a conical form, to facilitate the penetration; it is made of steel. The upper part is provided with two horizontal branches or handles used for taking hold of or forcing in the apparatus. Under the handle is found a zinc reservoir which contains the provision of bisulphide of carbon necessary for feeding the pump, and immediately beneath the recipient a pedal serves to complete the action exercised above on the handle.

The stake being forced into the soil to the greatest possible depth,

the injection of bisulphide of carbon is procured by a single movement.

It suffices to press with the palm of the hand the large flat button which terminates the rod of the plunger beneath the recipient; this plunger lowers rapidly in the feeding chamber, the upper part of which is provided with a Bramah leather fitting, which assures a uniform discharge. The plunger drives out through a narrow opening situated at the lower extremity of the stake, a proportion of bisulphide of carbon equal to the volume displaced.

To diminish the dose, it suffices to abate the progress of the plunger. This result is easily obtained by adding or withdrawing one or more copper washers, which, by being thrust upon the rod of the plunger, diminish the length of its course. The height of these movable washers is calculated so that each of them represents exactly a gramme of bisulphide of carbon. The instrument, without any washers, yields ten grammes of bisulphide of carbon at a stroke of the piston. By placing a washer upon the rod, this dose is diminished one gramme, and by adding two, three, four, or five washers, one has, instead of ten grammes, eight, seven, six, or five grammes.

The operator can therefore very easily arrange the delivery of the instrument according to the dose recommended in the tables of treatment. As to the management of the apparatus, it is very simple. The workman drives the point in by pressing at the same time on the handles and on the pedal until he has reached the resisting bed of the ground beneath; with the right hand he presses quickly on the flat button terminating the rod of the piston; he then withdraws the injector and shuts the hole of injection by vigorously beating down the soil with his foot. To drive the point in, to press on the head of the rod of the plunger, to withdraw the point, and to press the soil down firmly, such are the different kinds of treatment with the injector.

To understand this brief description well, it is necessary further to know certain details of construction. A large spring in a long coil is placed around the rod of the plunger; its use is to raise the latter above the barrel of the pump after each injection; by this means the instrument prepares itself for the expulsion of a new dose, and the operator has but one movement to make in place of two. The bisulphide of carbon gets into the barrel of the pump through several little orifices which are alternately covered and uncovered by the passage of the compressing plunger. At the lower part of the stake, in the piece of steel supporting the cone, is found inserted a fixed valve which opens only under the force of the downward pressure. This valve consists of a clack door acted upon by a spring. One can very easily examine this essential organ by unscrewing the steel cone; but, to impede the issue of the sulphide, if the apparatus was filled with it, at the instant when one wishes to perform this operation, the plunger should be lowered and kept in that position by means of the ball in the box of the instrument. In this position, the plunger prevents all issue, and takes the place of a true faucet.

The upper part of the instrument, which supports the handles, unscrews in such a way that it is easy to take the plunger out to wipe it off and grease it carefully every day after work. This little cleaning should be done with a soft dry linen cloth, and with proper oil, or, if preferred, with glycerine. One should never use emery paper, glass, sand, rotten stone, or other corrosive substances.

The operator will be very careful to stop up the orifice of the recipient, so that, while working, the sulphide does not escape, and not a particle of earth or gravel drops into the apparatus. The injector is an instrument made sufficiently solid, and capable of operating for a long time without getting out of order, provided the recommendations given above be properly carried out; but it is easily seen that, if, on account of too great a resistance to the penetration of the soil, the instrument is used as a lever, by acting laterally on the holders or handles, the perforating tube will be bent, and the soldering of the recipient be dislocated. The effect produced would be much more serious if the pointed tube was raised by the handles as high as the shoulders, to be afterwards hurled violently into the ground, as if it operated like a stake or a mining bar. The instrument might be rendered useless at the first stroke. In case the soil might offer too great resistance to the penetration by the process given—that is to say, by acting simultaneously, by simple pressure on the handles and on the pedal, it might be absolutely necessary to use a crowbar to make the holes.

It is as easy to understand that the mechanism will be deranged, at the outset, if there is let into the reservoir, or introduced into it any of the soil, any muddy water, or any other product containing solid matter susceptible of being entangled among the metallic pieces very carefully polished and adjusted. The reservoir holds four kilogrammes and five hundred and fifty grammes of bisulphide of carbon, say about the necessary quantity for four hundred and thirty-three holes, work for a third of a day. The apparatus, filled with bisulphide of carbon, weighs nine kilogrammes and one hundred grammes.

The pointed injector will be delivered to viticulturists, at the departments of the Rhone and the neighboring departments, at the cost of forty francs, taken to the terminus, packing and accessories included.



## APPENDIX G.

## USE OF BISULPHIDE OF CARBON.

[Material abstracted and translated by Dr. J. I. Bleasdale, Secretary of the Viticultural Commission.]

QUESTIONS RELATIVE TO THE USE OF SULPHIDE OF CARBON TO DESTROY  
PHYLLOXERA-VESTATRIX, ADDRESSED BY M. FRÉMY TO M.  
THÉNARD, THE EMINENT CHEMIST, TOGETHER  
WITH HIS REPLIES THERETO.

M. Thénard was the first to propose the use of sulphide of carbon for the destruction of phylloxera, in 1869. "Knowing that some of M. Thénard's vines were threatened with phylloxera," M. Frémy says, "I asked him if he still had confidence in the remedy which he had proposed—if its efficacy had been established by positive experiments, and if he himself had employed the sulphide of carbon to arrest the progress of phylloxera?"

M. Frémy proceeds, saying: "My own opinion is far from being settled, and to establish it, I shall feel only too happy if he can reply to the following questions which apply equally to the employment of all other kinds of insecticides:

*First*—We know that sulphide of carbon will kill phylloxera, but it might kill the vine as well. Can we secure the former while we avoid the latter?

*Second*—Is the application of bisulphide of carbon easy and practicable? Its action on the human system is formidable; might it not interfere with the health of the vignerons?

*Third*—We are told that by sacrificing one third of the revenue derived yearly from a vineyard, the other two thirds may be saved, provided sulphide of carbon be used. Is this fact thoroughly established?

*Fourth*—Can M. Thénard point out any localities where the phylloxera has already been exterminated by the use of sulphide of carbon? I should like, above everything, to be shown a plot of vines preserved from phylloxera, by sulphide of carbon, *after a certain time*, while those which surround the treated ones have completely perished.

*Fifth*—Finally, I would ask if the qualities of our fine wines will not be altered by the repeated application of sulphide of carbon, and if this agent will not at last render the soil barren by acting on the mineral elements which enter into its composition?

## REPLY OF M. THENARD TO M. FREMY'S QUESTIONS.

I reply to the questions of my eminent confrère and friend with all the greater satisfaction because the results of treatment have

proved quite favorable; are authentically established; and because I have had something to do with the success myself.

The sulphide and bisulphide was put down in holes made in a furrow, into which was placed a dressing of the oil-cake of hulls of peanuts, after the oil had been extracted, and then covered with a plowed furrow. Two experiments were made—one by the late Dr. Chaigneau, and the other by M. Cahussac.

In the first the dose calculated upon a co-efficient of 15.00 kg. to the hectare were put in holes made with mallet and crowbar, at distances from each other of 0.40 metre to 0.45 metre. The effect on the insect was astonishing, but half the vines were killed also. In the second the quantity was diminished to six kilogrammes.

The results proved satisfactory, and if we had had, like M. Marion, the happy idea of repeating the operation five or six days later, our experiment would have been as complete as were his with his repeated application. From this time forward I troubled myself no more about the success of sulphide of carbon, except to ask M. Balbiani to ascertain, if, in view of the resistance which the insect is capable of offering to the sulphide, the young eggs of the phylloxera would not escape the destructive vapors. By and by we shall see the happy results obtained by M. Marion by working out this observation.

All I had to do with this matter was to throw out useful hints, and the credit of success belongs to M. Allés, of Marseilles, who, by using small quantities and repeating them every month during five months, has saved his vineyards; and at the same time has convinced M. Talabot, who since then has induced the great company, Paris, Lyons, and Mediterranean, which he manages, to avail themselves of it, and spare no expense to probe its efficacy to the bottom (*La couler à fond*). Besides M. Marion, Professor in the Faculty of Marseilles, Messrs. Gastine, Molère, Catta, Balbiani, Cornu, and Boiteau have added much to our knowledge of the insect and the mechanical means of best applying the sulphide of carbon.

#### ANSWER TO THE FIRST QUESTION.

Bisulphide of carbon is employed under three different conditions:

1. If we have to treat an isolated patch, which we may unexpectedly meet with in a vineyard situated at a considerable distance from an infected district, we immediately proceed to extreme measures in applying what is called treatment *à mort*. It consists in making one hundred thousand (cent mille) injections of sulphide per hectare, to the amount of about seven hundred kilogrammes. Then repeat the same after six or seven days.

This repetition is rendered necessary on account of the resistance which the young eggs offer, and which having escaped the first treatment, may hatch and repeople the vineyard.

This royal treatment (*traitement à mort*) is had recourse to only on relatively limited small patches, demanding only a small sacrifice in exchange for a great benefit. It is a splendid invention. The Swiss, wiser than us (French), use no other method, and after five years,

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Metre=39.37 inches.

Hectare=10,000 square metres=2.471 acres.

Kilogramme=2.204 pounds avoirdupois.

Gramme=15.432 grains.

Litre=2.113 American pints.

during which their vineyards have been attacked, they have not yet lost as much as a dozen hectares.

2. When, in consequence of the want of surveillance, or disinclination, or ignorance on the part of vineyardists, instead of one patch we find several, which by their position indicate a general invasion of phylloxera, the above royal treatment has become impracticable; then we have recourse to preventive treatment; the quantity to be used is reduced from one thousand four hundred kg. to six hundred kg. at most, injected as before on two different occasions; but in larger quantity about the center of the attacked patches than the outside. This treatment is generally adopted from the end of June to the end of September, while the vineyard, being in full vegetation, offers the least resistance; thus the special object is to diminish the number of winged insects, which begin to appear about that time and spread; or if the season be too far advanced, as in September, to reduce the evil caused by the increase of the pest, which, however difficult to account for, does occur at this season of the year.

In order to prove thoroughly useful, even though the richness of the soil were to surpass that of Clos de Montrachet, one of the most fertile that M. Joulie has ever analyzed, the preventive treatment ought to be accompanied by a manuring of at least twelve tons of farm-yard manure to the hectare, or their equivalent in chemical manure. This *absolute* necessity for manure would appear to be indicated by the following consideration:

It is by the roots that phylloxera attacks the vine, and it is by throwing out new roots that the vine has to recover itself again.

3. If, without having been able to discover phylloxera, as it happens in my case this year, a vineyard is situated close by another where an infected patch has been discovered, the utmost prudence suggests cultural treatment.

The proper time for it is during the Winter, after the vintage and until the return of vegetation. Generally it consists of only one injection of from two hundred and fifty kilog. to three hundred kilog. of sulphide of carbon, divided into thirty thousand holes, though the more careful vineyardists prefer to apply the above quantity twice in twenty thousand holes the first time.

Manuring, though not theoretically required, as it is in the preventive treatment, is indispensable, for we run great risks in underestimating the limits of an invasion of the pest; in fact, it is often far wider spread than we imagine. As for the rest, the cost of the manure being covered by the increased crop, it is madness to neglect it.

#### REPLY TO THE SECOND QUESTION.

We have already mentioned that the *pal Gastine* protects both the workmen and the vine perfectly from the sulphide of carbon. I may add that the bisulphide is brought on to the ground in sheet-iron casks of one hundred kilog. each, to which we adapt an ingenious form of stopcock (robinet) which prevents any loss.

#### REPLY TO THE THIRD QUESTION.

The annual cost of cultural treatment, per hectare, in giving it two injections of one hundred and fifty kilogrammes each, is three hundred and sixty-four francs, viz.: Sulphide of carbon, three hun-

dred kilogrammes, at forty francs, one hundred and twenty francs; labor, thirty-two days, at two francs, sixty-four francs; twelve tons of manure, or its equivalent, at fifteen francs, one hundred and eighty francs. Total, three hundred and sixty-four francs.

For vines habitually treated with the above quantity, the sum of one hundred and eighty francs is to be deducted; when not so, it must be let stand, because the increased returns of fruit cover it. Consequently, the additional expense is yearly one hundred and eighty-four francs, answering to eleven or twelve per cent. of the price of the wine, if we accept the data of one hundred hectares at twenty francs each, for common wines of the south; twenty-eight hectares, at fifty-five francs each, for the great ordinary wines; and twelve and five tenths hectares each for the grand crus of Burgundy. But if the vines are severely attacked, and if it be necessary to treat them at least twice, once in Winter, and again in either Spring or Summer, and that during two or three years, without obtaining hardly any fruit, there will be a nearly dead loss of from seven hundred francs to one thousand seven hundred francs. This shows how important to the vineyardists it is to lose no time.

#### REPLY TO THE FOURTH QUESTION.

The Company P. L. M. publishes accounts annually of details. If my memory serves me, the quantity of sulphide disposed of has been one thousand seven hundred kilogrammes the first year, twenty thousand kilogrammes the second, one hundred thousand kilogrammes the third, two hundred and forty thousand the fourth, and the actual quantity used now amounts to four hundred and fifty thousand kilogrammes. Into the sand and gravel of Médoc and l'Aubignon we believe the phylloxera would not penetrate. Now, if there be any place where the vine appears to resist it better than another it is at Chateau Lafitte. But happily, since its first appearance, M. de Rothschild has energetically combatted it with the means of which we are speaking and with the concurrence of MM. Catta and Lieutaud. As a conclusion on this point, we say that wherever the *pal Gastine* can penetrate, if the ground be of sufficient consistency to be made solid by the action of the rammer (or demoiselle) used to stop the holes made by the *pal*, there is every reason to expect success. Unfortunately, it only too often happens that when everything else has been well done, the rammer is not sufficiently used, so that the sulphide evaporating too rapidly never reaches the insect, and only scorches the leaves of the vine.

#### REPLY TO THE FIFTH QUESTION.

As far as concerns the sulphide of carbon, cultural treatment produces no effect on the quality of the wine; but we cannot say so much about the manure which must accompany the sulphide.

The preventive treatment, when had recourse to shortly before the vintages, certainly does distress the vine, and likewise hastens the ripening of the fruit, which, like a "*fruit vereux*," has not the qualities of healthy fruit. Necessarily the wine suffers; not that it gets that detestable (*affreux*) taste imparted to it by sulphuring the vine, but it has a certain greenness, is less spirituous, and is of a *mauvaise*

*santé*. In relation to this, it is not desirable to have recourse to the preventive treatment until compelled to do so.

#### REPLY TO THE QUESTION OF IMPOVERISHING THE SOIL.

Sulphide of carbon has no action on the components of the soil; it neither dissolves nor fixes anything in an appreciably sensible degree. It disappears so rapidly that there is no room to fear ill effects, like those which result from employing sulpho-carbonates, except with the greatest care. These last, in effect, since they dissolve almost instantly in the soil, as M. Rommier has demonstrated, cause the loss of a quantity of humus nearly twenty times the weight of the alkaline sulphur set at liberty.

N. B.—The Académie will learn with satisfaction that this savant, turning this loss to profit, is about to publish a work immediately, from which the cultivators of common vines will, without reducing in any way the fertility of their vineyards, derive assuredly some profit. (Comptes Rendus, p. 931, anno 1879. Séance du Lundi, 1re Decembre, 1879.)

#### ON THE METHOD OF APPLYING SULPHIDE OF CARBON.

[A letter by M. Boiteau, Delegate of the Académie, to M. Dumas. Séance 26 January, 1880.]

From investigations made in the course of last year, it results that, since sulphide of carbon is one of the most destructive agents of the root systems of the vines, there has arisen the necessity for modifying the use of it, and for working the problem, "*how effectually to kill the phylloxera with the least injury to the vine?*"

Its destructive effects, to which I called attention early in 1879, referred to the use of it in the Gironde. Since then, I have visited the south of France, and have satisfied myself that the same accidents occur in all the various climates as were noticed in Gironde. I observed them in the Herault.

There is now no longer a doubt that great care indeed has to be taken against these destructive effects—but which we can now render harmless. Quite recently, I caused some old vines to be rooted up which had received last year their first application of sulphide of carbon. It was an easy matter to account for what had taken place when I inspected the root systems. All the roots above 0.05 metres were totally mortified in the vicinity of the injections. It would be rash to deny facts like these, which might prove so ruinous to the proprietors of vineyards, by leaving them in the belief that sulphide of carbon is perfectly harmless to the vines. What I deduce from these proofs is, that, without abandoning the only remedy which can help us, we should convince ourselves of its dangerous effects, and discover among the various ways of employing it those which will most certainly kill the insect without hurting the root or vine. As a general rule, it would be safer for a few insects to escape for the present, than to attack the root-system too energetically.

All that we should aim at effecting is to destroy the greatest number possible of the insects with the smallest number of injections of sulphide. There is, however, a limit beyond which we cannot go.

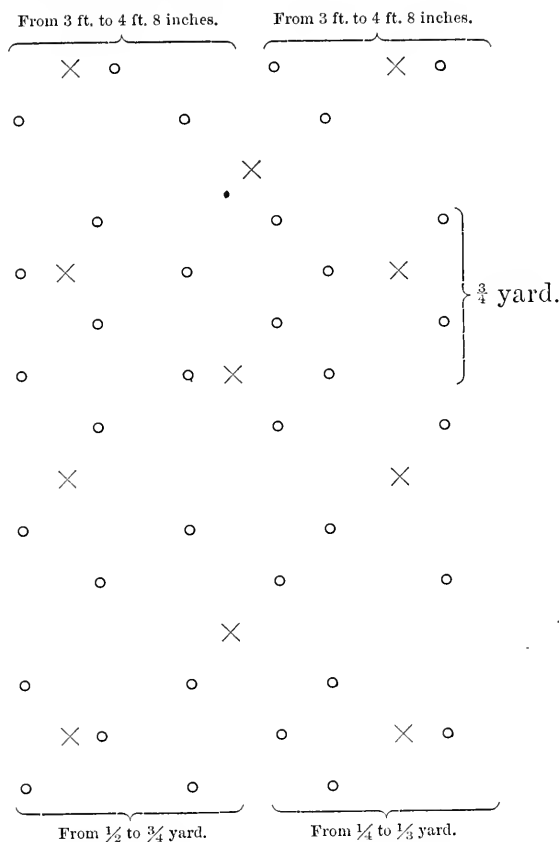
The vapor of sulphide of carbon radiates to a distance, which

might amount to more than 1.50m; but its effect as an insecticide does not in any case exceed 0.35m or 0.40m at most. It is therefore necessary to make at least two injections to the square metre. This minimum quantity cannot be reduced if the effects are to be relied on. It is also requisite that injections be so disposed as not to attack the system of roots in the whole circumference of the vine, in order to leave as many rootlets as possible intact. All treatment which proceeds on the idea of surrounding the vine with a girdle of injections, must be put aside. Reiterated injections, with all the holes changed, are productive of the largest number of deaths among vines. It is equally as bad as the plan of making an injection at the very root of the vine. This last has afforded the very worst results.

In order to avoid, as far as possible, all these accidents, the following will be found applicable to all vines, whatever be their distances in the rows. It consists in making the injections in lines parallel to the rows of vines, keeping to the right and left of them, at distances that may vary according to the width of the rows, but which in no case ought to be less than 0.25m to 0.30m. These distances, variable between the interlines, are not so in the sense of lines; and by these we take the maximum distance between one hole and another, which ought to be of 0.70m or 0.75m. By this means we have parallel bands which have no injection holes. The rows of vines are between these bands, and their roots may run there without danger of poison. The number of lines of injection varies between each interline of vines, according to the width of these. The injections ought to be made at a maximum distance of 0.70m to 0.75m. There ought to be as many lines of injection as there are times 0.70m or 0.75m in the interlines. It will soon be seen that the distances are not regular multiples of the numbers which modify the distances, and by consequence the quantity to be injected. If the remedy acts efficaciously on the insect, it is by being injected in determinate quantities per square metre. The quantity which has seemed to us to give excellent results varies between sixteen grammes and twenty grammes per square metre, and at two injections. If the operation has to be gone over a second time, or oftener, it is necessary to use the same holes as before, to not increase the chances of accidents. In simple treatment, repeated from year to year, one should, as far as possible, use the same holes.

After what has been said, the following is the advice we would offer to the operators: Generally, where the vines are planted at distances of from 1m to 2m, and from 1m to 1.50m, it is necessary to make two lines of injections; and in from 1.50m to 2m, to make three. In plantations of 1m to 1.50m there are many conditions which cause the number of injections to vary, and require different quantities. It is the same with plantations of between 1.50m and 2m.

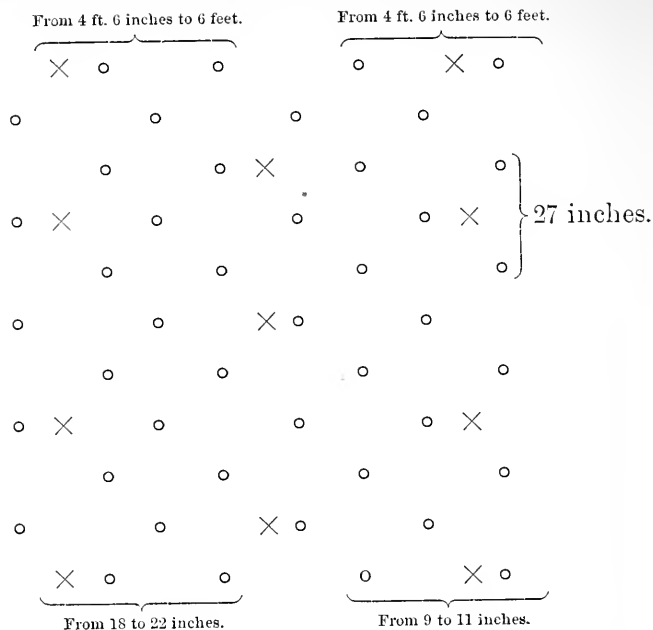
The following figures show the position of injection holes, when the vines are planted at from 3 to 4.8 feet apart, and from 4.8 feet to 6 feet:



In the interlines the distances of the holes vary from one foot six inches to one foot nine inches. Of the injection holes in the line of the vines the holes vary from nine inches to fourteen inches. In the sense of lines, the injection holes have a mean distance of nearly twenty-seven inches. The number of injections per acre will vary from about seven thousand six hundred to eleven thousand six hundred. From these numbers of holes, which are the extremes of many means of intermediate distances, we arrive at the quantities of bisulphide of carbon to be injected:

From 1 yard to 44 inches.....	108 grains = 7 grammes.
From 44 inches to 50 inches.....	120 grains = 8 grammes.
From 50 inches to 56 inches.....	139 grains = 9 grammes.
From 56 inches to 66 inches.....	150 grains = 10 grammes.

In the interlines the distances of the holes vary from eighteen to twenty-two inches. Of the injection holes in the lines of the vines, the distances vary from nine to eleven inches. In the direction of the lines, the holes have a mean distance of twenty-seven inches. The number of injections per acre varies from eight thousand seven hundred and sixty to eleven thousand six hundred.



From the above number of holes, which represent the extremes of many means of intermediate distances, we deduce the following as the quantities of bisulphide of carbon to be injected, viz.:

From 54 to 58 inches	-----	92.58 grains = 6 grammes.
From 58 to 68 inches	-----	108.00 grains = 7 grammes, each injection.
From 68 to 71 inches	-----	120.00 grains = 8 grammes, each injection.

If the rows of vines are not set out at regular distances, we should calculate the quantity to be used by the distances shown in the tables; and if the irregular spaces alternate regularly, we may take the mean of two interlines, and work according to it.

In plantations of two or three rows of vines, the work is to be done as above; but it is necessary to make behind the last row two lines of injection, the last one at twenty-seven inches in every direction.

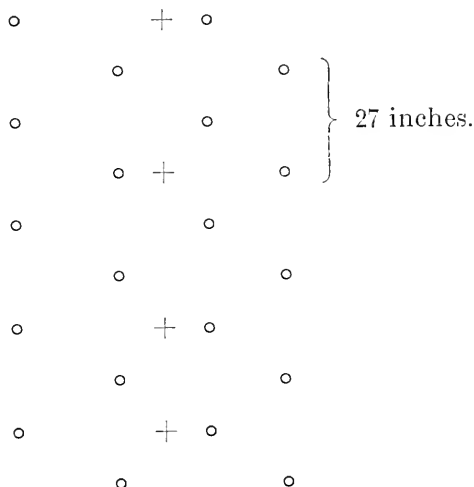
Where the vines are planted in single rows, the injection holes should be made at a distance of one foot from the line of vines, but it is also necessary to make two lines of injection holes on each side, the last at twenty-seven inches distance the whole way.

The dose of sulphide ought to be one hundred and thirty-nine grains, equal to nine grammes. The holes are stopped up by the laborer, by stamping with his foot over the hole.

M. Boiteau continues: "Sulphide of carbon destroys insects, only when they are upon the roots, or portions of the vine covered by about two centimeters (say four inches) of earth. Those insects which are resting on the crown of the root, or upon the bottom of the upper roots, nearly always being killed, they thus become the principal of the reappearance of phylloxera in Summer. In order to be perfect and complete, the treatment of sulphide of carbon should be assisted by a painting or smearing of the lower portion of



the plant and the base of the first roots, in order to kill those which have escaped the vapors of the sulphide of carbon.



This very inexpensive operation may be performed during all Winter. But whenever it is done, care must be taken that the buds of the vine have not started, and this takes place, in France, generally in April. In order to facilitate the action of an insecticide solution, it is best to raise the earth from around the vine, so as to form a basin, exposing the crown of the first roots.

As insecticide agents, we can avail ourselves of the various sulpho-carbonates, either pure or in fifty per cent. solution; or, again, of solutions whose base is heavy oil of coal tar. The following is the one I recommended as being both very effective and not injurious:

Slacked lime made into moderately thick, smooth paste, five parts; heavy oil of coal tar, one part. Mix them together as masons mix mortar, so as to incorporate the substances perfectly. The result will be a black paste of a very penetrating odor, and of a greater or less consistency. This paste should be kept in a cool place. When we proceed to use it, we mix it with eight or ten times its volume of water, and stir it up vigorously with the paint brush, with which it is afterwards to be applied. Use any common bucket, which the workman can carry in his hand. It is desirable to give the liquid a stir up every time the brush is dipped in. This mixture holds the coal-tar oil in complete solution, and does not clog the brush; it cannot injure the vine. The crown of the root and the base of the first (or sun) roots should be well smeared with the solution, and a portion of the liquid allowed to flow round the principal root (*racine pivotante*), and the earth taken out to bare the root.

If sulpho-carbonates are to be used, the method of employing them is the same; but in this case it is necessary to replace the earth immediately, to prevent any escape of vapor. With preparations the base of which is the heavy oil of coal-tar, this necessity is avoided, and the earth may be replaced afterwards.

## APPENDIX H.

AN ABSTRACT OF THE WORK OF THE PHYLLOXERA COMMISSION OF THE  
FRENCH ACADEMY OF SCIENCES.

[Translated by Dr. John I. Bleasdale, Secretary of the Viticultural Commission, from the reports for the years 1872-9 inclusive.]

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Experiments were conducted at Cognac, on attacked vines, with coal tar, recommended by M. Petit. Note by Mouillefert: They proved a failure in every instance; but some phylloxera were found dead. M. Balbiani appears satisfied with his experiments, but they are contradicted by those of M. Mouillefert.

After vapor of sulphide of carbon, the most effective remedies appear to be the sulpho-carbonates of potassium and sodium. Dumas suggests a method of preparing them commercially without the use of alcohol. (p. 851.)

N. B.—The difficulty about the sulpho-carbonates lies in their not being sufficiently easily diffused about the roots of the vines.

For methods adopted to discover the most efficacious means of destroying phylloxera, see notes by M. Max Cornu, pp. 1040, 1042, 1189, 1314, 1388. He arrived at the conclusion that the best were cyanide K and  $C_2^2$  K. (p. 1388.) The cyanide, however, could not be used by laborers on account of its poisonous properties on man.

Pasteur thinks it possible that the propagation of a *filamentous mycellium* on the roots of vines would destroy phylloxera. A letter from Herr Schuetzler, concerning the vine disease at Cully, states it to be the *mycellium* of a mushroom (*champignon*). (p. 1234.)

Experiments on healthy vines with poisonous matters, by M. Baudremont. (p. 1392.)

### COMPTES RENDUS, 1874, JULY TO DECEMBER (INCLUSIVE).

*On the comparative composition of the vine in health, when attacked by phylloxera, by M. Bautin.*

	Healthy Vines, per 100.	Phylloxera Vines, per 100.
Bark, fresh roots, cane sugar .....	2	0
Bark, fresh roots, glucose .....	0	1
Fresh roots, without bark, albumen .....	2	0.6
Fresh roots, without bark, oxalic acid .....	17.80	4.04
Roots dried at 100 C., pectic acid .....	6.20	1.90
Roots dried at 100 C., tannin .....	9.60	7.68
Small roots (radicelles), carbonate, K O .....	1.48	0.428
Small roots (radicelles), total ashes .....	6.42	12.85
Leaves gathered in June and dried at 100 C., carbonate of potassa .....	1.35	0.72
Leaves gathered in June and dried at 100 C., total ash .....	8.80	2.95
Dry leaves collected in September, $C_2^2$ K O .....	0.72	0.39
Dry leaves collected in September, total ash .....	13.25	13.00
Cuttings dried at 100 C., carbonate K O .....	1.99	6.26
Cuttings dried at 100 C., total ash .....	3.45	3.49

## COMPTES RENDUS, JANUARY TO JULY, 1875.

M. Girard states that phylloxera on vine roots in situ were inclosed in metal tubes and exposed to a temperature of six to ten degrees below zero without any perceptible effect on them. (p. 436.)

M. P. P. Mestre describes a process for using sand. (p. 558.)

Long note by M. Marés on results of experiments made in 1872, 1873, and 1874, all leading up to the use of vapors, especially sulphur, in some form, chiefly derived from alkaline sulphates. (pp. 1044-5-8.)

M. Dumas italicises the following sentence in his communication to the Academie Séance, nineteenth of April, 1875:

"Alkaline sulpho-carbonates are the most energetic substances against phylloxera, which have hitherto been proposed, and consequently merit the closest attention of all concerned in the reëstablishment of our vineyards.

"When I proposed the employment of those salts, I had already satisfied myself that the substances, whether mineral or organic, with which they might come in contact in the soil, would have no action on them; that carbonic acid would decompose them, giving rise to a disengagement of sulphydric acid and sulphide of carbon, the destroyers of insect life; that any animal placed near those salts, whether solid or dissolved, would be quickly killed; finally, that solutions of them sufficiently diluted would exert no perceptible action on the plants whose roots were wetted by them." (pp. 1048-51.)

M. Pellet reports the good effects obtained by the use of sulphide of potassium, and of sulphate of ammonia mixed with the ashes of burnt vine twigs (*sarments*). (p. 1226.)

M. Villedieu, la vase du Rhone avec des sels alcalines en du sulfate d'ammoniaque. (p. 1226.)

M. Godet sends to the Academie the composition which he employs, viz.: sulphide of potassium, six tenths; saltpetre, three tenths; bone meal, one tenth; thirty to fifty grammes to ten litres of water, and the liquid is poured over the vines.

MM. Zoeller and A. Grete. Xanthate of potassa. Its action is however the same as that of the sulpho-carbonates. It is much dearer. (p. 1347.)

M. F. Moll recommends a solution of soft soap and coal tar against the larva of beetles and slugs.

## COMPTES RENDUS, JULY TO DECEMBER, 1875 (INCLUSIVE).

MM. Zoeller and Grete inform the Academy that their mode of developing sulphide of carbon is not tied to the production of a xanthate obtained by using ethylic alcohol; but that any other crude cheap alcohol does just as well.

"We shake together a concentrated solution of potassa (K O) and crude amylic alcohol in equivalent quantities; then add sulphide of carbon and stir briskly, and we obtain quickly a solid salt, almost dry, which crystallized in scales—the amyloxanthate of potassium. As to the action of this it is the same as ordinary xanthate. Repeated experiments in the use of it show that used in the quantity of one gramme, mixed with super-phosphate, it will produce no injurious effects on herbaceous plants growing in one half litre of earth. For bushes (*arbustes*), when used in a dose above seven grammes, they suffer." (pp. 194-5.)

CHANZEY, August 30, 1875.

"Since the ground was already charged with wet, it was considered that eighteen litres would suffice for each vine; that would be thirty-six litres to the square metre. Fifteen grammes of sulpho-carbonate were dissolved in nine litres of water, and after this had been absorbed in the ground, the remaining nine litres were poured in to insure the diffusion of the poison all round and among the roots of the vine. The water used was the common water of the neighborhood. These experiments seem to have been quite successful. They did not, however, kill the eggs, as some of them afterwards produced insects.

## COST OF TREATMENT.

62 days labor @ 3 frs.....	186 00 frs.
360 kilogrammes sulpho-carbonate.....	408 00 frs.
Cost of pipes and connections.....	105 80 frs.
Zinc buckets and small expenses.....	14 50 frs.

This makes 992 francs per hectare, or for .72 hectare ----- 714 30 frs.

Apropos of the above, M. Dumas proceeded to remark:

"The confidence which I had in these salts (sulpho-carbonate of potassium), arising out of their composition and their properties, has been confirmed, and the effects of them may be summed up as follows:

"A. Wherever the solution of these salts, or the vapors arising from them penetrate, the phylloxera is destroyed.

"B. The vine suffers no injury; on the contrary, the green appearance of the leaves and the abundance of young roots (*chevelu régénéré*) testify to an energetic renewal of vegetation.

"C. If we do find occasionally a few phylloxera on the spots treated, they are young larvæ, very lively, near the surface of the ground—possibly from neighboring vines not treated, or from some eggs concealed in the fissures of the vine, or of the ground, where they were sheltered from the action of the poison.

NOTE.—By M. Maurice Girard. Experiments made by himself and M. Boutin in the experimental grounds at Angoulême, showing the good effects of placing around the vine, just above the roots, a bed of sand or dust mixed with coal tar, so as to prevent the descent of the apterous insects to the roots. This plan is highly spoken of by M. Balbiani, p. 626.

"D. The vine is freed from the insect, or at least placed in the condition it was when first attacked, which enables it to mature its fruit, and allows time for the vigneron to renew the treatment.

"Two points remain: First, to reduce the price of sulpho-carbonates to their true cost, which rests with the manufacturing chemists; the second concerns the vinerons, who should work out the best methods for employing them." (p. 785-9.)

N. B.—It is reported that phylloxera-vastatrix is not carried from place to place, except on vines alone. My experiments prove that it may be carried in our clothing.—J. I. BLEASDALE.

COMPTES RENDUS, JULY TO DECEMBER, 1875.

M. Mouillefert reports that the roots of vines treated with sulpho-carbonates, in 1875, were quite healthy in January 1876. (p. 317.)

M. Garrveau proposes to employ the cultivation of insecticidal plants. (p. 388.)

At page 434, *et seq.*, a letter by M. J. Rouselliro to M. Dumas describing a method of employing sulphide of carbon, and giving a sketch of the instrument employed. He reckons that a laborer can make four thousand holes per day with it, in ordinary ground.

N. B.—Superiority of sulphide of carbon to alkaline sulpho-carbonates. The latter stimulate the vine at the same time that they kill some of the insects, and cause a start of new rootlets; but these serve as fresh and succulent nourishment for the living, and especially the newly hatched phylloxeras; and this appears to explain the rapidity of the reinvasion of vines treated with sulpho-carbonates, upon which, some time after the treatment, we find the insects more numerous and more vigorous than before it was employed. (p. 436.)

NOTE BY MR. SABATÉ.—On scraping off the old dry bark of the vines. He believes that the eggs of the insect which produce the young brood in the Spring are deposited in chinks and underneath the old bark. The work can be done by children. The result proved beneficial on thirty hectares, which were so treated, while forty hectares were not treated. All the vines (free from the insect) which were deprived of the old sealy bark flourished vigorously, and did not suffer from cold. The decortication was carried on through December, January, February, March, and April, till the buds were ready to burst. There was no difference between those stripped before, during, or after the colds. (p. 438.)

M. Th. Pignede to M. Dumas, on treatment with *lime* tried on vines quite unproductive and nearly dead: "During all March and the early days of April I dig around the diseased vines a trench, ten centimetres deep and the same breadth, into which I put two double handfulls of slacked lime; I then coat the whole plant over with a brush with milk of lime; but having previously, with care, removed the old outer bark. This triple operation destroys the most part of the insects and eggs, which have been deposited on the vine, and prevents the insect coming from an infested vine, reaching the roots of one thus treated. This remedy is both preservative and curative. I am persuaded that if applied to healthy vines it would preserve them from phylloxera. I experimented this year on only five or six hundred vines very far gone indeed. *Ils sont aujourd'hui magnifique et portent de nombreux raisins.*" (p. 601.)

#### JANUARY TO JULY, 1876.

M. Gachez writes to M. Dumas that he sowed red maize (*maise rouge*) between the rows of vines suffering from the insects, and that they all left the vines and fed on the roots of the maize. (p. 632.)

M. F. Allies to M. Dumas, letter on the details of the application of bisulphide of carbon. (p. 702.)

M. Maumene claims priority for the recommendation of planting thyme between the rows of vines. (p. 704.)

M. J. Francois recommends to cease all cultivation of the ground as soon as phylloxera appears in the vineyard, and observes that the more the soil is wrought the faster does the insect kill the plant. (p. 1147.)

M. Alph. Milius—An application of cyanide of potassium and potash, K. & K. O.

M. Boutinainé—"At the departmental laboratory Angoulême, which is under my direction, I have just finished certain analysis which I had undertaken, with the view to ascertain what are the immediate principles which enter into the general constitution of American vines as compared with those which I have already found in French vines; but, mainly, to determine if there exists in the constitution



of American vines some principle rendering them proof against phylloxera.

"Having discovered in all varieties of American vines a *resonoide* principle, to which I paid no attention during my study of French vines, I have instituted fresh researches to see if it does exist in French vines. I have proved the presence of this principle in French vines, but only half as much per cent. as in American resisting varieties, and one third less than the quantity found in the non-resisting ones, which themselves contain only three fourths of the quantity found in resisting vines.

"This fact, now well established, it seems to me, furnishes irrefragable proof that the power to resist phylloxera is due to the large proportion of this resinous or resinoide principle in those American vines. I will endeavor to determine, later on, the physiological causes which concur in the production of it, but henceforth we may safely conclude that to it the resistance is due. The other immediate principles found in American vines are, with one exception (malic acid), the same as those of our French vines; but, as will be shown further on, the proportions vary sensibly. The oxalic acid, which occurs in great abundance in the French vines, is replaced by malic acid in the roots of the American vines, and we find it there in far less proportion than oxalic acid in French vines.

"As I have endeavored to show in my first work on the analysis of French vines, everything leads me to believe that it is a first oxidation of oxalic acid, which changes it into malic acid, and a fresh oxidation when the fruit is becoming ripe, which converts it into tartaric acid.

"If we admit that the acid nature of malic acid is stronger than that of oxalic acid, we may suppose that its presence in the roots of American vines contribute something to their power of resisting phylloxera.

"Below are the complete results of the analysis of the roots of an American resisting vine, the Clinton, placed alongside that of the roots of a French vine:

	American resisting vine roots of Clinton.	Healthy French vine roots of Folle Blanche.
Bark of fresh root, cane sugar.-----	0.66	2.00
Bark of fresh root, glucose-----	0.34	2.00
Bark of fresh root, starch-----	1.35	5.85
Roots stripped of their bark, albumen-----	traces	2.00
Roots dried at 100 centigrade, tannin-----	4.80	9.60
Roots fresh without bark, malic acid-----	5.40	9.60
Roots fresh without bark, oxalic acid-----	5.40	17.80
Roots dried at 100 centigrade, resinoide principle-----	8.00	3.95
Roots dried (burned), carbonate of potassa-----	2.40	2.00

"Instituted researches in the fresh bark of the Clinton, a resister, Concord, a non-resister, and Folle Blanche, with results as under. All dried at one hundred centigrade:

Bark of the roots of Clinton, resinoide principle-----	14.90
Bark of the roots of Concord, resinoide principle-----	11.08
Bark of the roots of Folle Blanche, resinoide principle-----	8.10
Roots stripped of bark, Clinton, resinoide principle-----	1.57
Roots stripped of bark, Concord, resinoide principle-----	1.10
Roots stripped of bark, Folle Blanche, resinoide principle-----	0.739

## CHEMICAL METHODS ADOPTED TO DETERMINE THE ABOVE POINTS.

"The root was dried and reduced to powder, and put with sulphuric ether into a displacement apparatus, the ether for the most part distilled off, and the residue evaporated over the water bath in a weighed capsule. The residue (resinoïde) weighed, gave the percentage. This resinoïde is solid, shining, slightly colored brown by some coloring matter. It burns, like other resinous bodies, without yielding any distinctive odor; it is slightly bitter without being astringent; it is insoluble in sulphide of carbon; it does not appear to saponify with potash; it is solid at boiling water, two hundred and twelve degrees, loses color and becomes white, but appears to undergo a modification, for it then becomes only sparingly soluble in ether. Boiled in concentrated nitric acid, violent action is set up, with abundance of nitrous fumes. When this ceases, on evaporating it to dryness, we obtain an orange-colored substance, very bitter, and when dissolved in water, one of very beautiful yellow. This last is picric, or carbozotic acid, and, since there is no trace of oxalic acid, it is clear that it contains no tannin. This I believe to be the true principle, but it must be present in quantity to become resisting to phylloxera, viz.: eight per cent. in the entire root, and fourteen to fifteen if we take the bark alone. When bitten by the insect, this matter forms a cicatrix and stops the waste of sappy matters—a circumstance not met with in non-resisters. (pp. 735-39.)

## COMPTES RENDUS, JULY TO DECEMBER, 1876.

M. Alph. Rommier writes to Dumas, advising phenic acid and alkaline phenates to be applied to the vine, not to the roots. (p. 959.)

Letter to Dumas by M. Lachanal, on the conditions requisite for the employment of insecticides for the destruction of phylloxera. (p. 962 *et seq.*)

M. J. Sabaté, referring to his note, August last, concerning decortication of vines by the use of a glove covered with wire, or wire gauze, states that the success is remarkable. Eight hectares of vines, sixteen years old, almost utterly destroyed in 1875, but decorticated last Winter, during severe cold, have almost quite recovered and are bearing fairly already. This treatment may be safely recommended. (p. 1085.)

M. H. Marès notes at length the results obtained by the use of sulpho-carbonates with manure, and compressing the ground. (p. 1142.)

M. C. Poussier recommends alkaline chromates in solution. (p. 1167.)

M. Foex. A long note on effects produced by phylloxera on American and European vines. (p. 1218.)

M. Rousselier. Treatment of vines with a mixture of sulphide of carbon, heavy oil, and resin oil. (p. 1219.)

M. Mouillefert. Results obtained at Cognac, by treating diseased vines with alkaline super-carbonates, and decortication followed by painting (*badigeonage*). (p. 1224.)

M. J. Laureau. On the power of wood charcoal to absorb sulphide of carbon and its employment. (p. 1280.)

## COMPETES RENDUS, JANUARY TO JULY, 1877.

M. Boiteau describes minutely an instrument for employing sulphide of carbon in the subsoil. (p. 21.)

M. Fournet proposes to employ sulphide of carbon intimately mixed with heavy oil (*l'huile lourde*), or coal tar, but first reduced to the condition of dust, which can be easily done with burnt earth, soda, or plaster of Paris in powder. Before using the mixture we must add phosphate of lime, in powder, sulphate of iron, and if there be no wood ashes available, then sulphate of potassa.

M. P. Boiteau describes the preparation and use of a liquid for painting a portion of the diseased vine, and gives drawings of the utensils required. Preparation of materials:

Water.....	1 part.
Carbonate of soda.....	1 part.
Heavy oil.....	2 parts.

100 kilogrammes per hectare. (p. 219.)

Boiled four or five minutes; let cool, and any loss replaced by water. (It is not easy to understand the details of mixing, diluting, and applying, without the diagrams. The aim is to kill eggs and insect by external application.)—J. I. B.

M. Rommier proposes salts or oxide of mercury, lead, copper, zinc, and others, dissolved in alkaline hyposulphites (potash or lime). (p. 380.)

## PREVENTION OF THE SPREAD OF DISEASE.

By a letter dated first February, 1879, the Minister of Agriculture informs the Académie that, "repeatedly demands have been pressed on the Government with a view of having the Department armed with power sufficient for arresting phylloxera by the most extreme remedies. These demands come supported by the experiments made at Prégny, which appear to have been satisfactory. Under these circumstances the Minister of Agriculture applies to the Académie of Sciences for light on the subject, as follows:

*First*—Ought we to consider the uprooting of infested vines and others for a certain distance all around, an efficacious means of arresting phylloxera?

*Second*—How far round the attacked vines ought this uprooting to be carried on?

*Third*—If we uproot diseased vines, as a measure of protection, ought we not to destroy American vines in all the districts not yet attacked?

*Fourth*—Should not the Government be armed with power to deal officially with diseased vineyards in districts where phylloxera has appeared?

The Academy replied as follows:

*First*—To prohibit the exportation of vines from infected districts.

*Second*—To prohibit the introduction and planting of vines from infected localities in districts not yet invaded.

*Third*—To destroy every point of attack, in districts not yet invaded, by scrupulously uprooting of the vines and their roots, and then and there burning on the spot both roots, tops, leaves, and poles or props; in fact by perfect disinfection of the land.

*Fourth*—To disinfect the ground and the vines in the suspected circumference, all round the infected spot.

*Fifth*—To disinfect the vines, as a measure of precaution, even farther back than the last named.

These conclusions were adopted by the Academie. (pp. 428-432.)

M. Bageau recommends a solution of gutta percha or caoutchouc in sulphide of carbon. (p. 488.)

M. Bouley corrects an error—it was the Canton of Geneva, not Switzerland, which stamped out and still keeps phylloxera out.

M., The President du Comice Viticole des Pyrénées—Orientales—believes that though some American vines will resist phylloxera, yet if even those be brought into a country there will always be phylloxera present. No vines from without, whatever, are allowed to be introduced there. (p. 600.)

M. Mouillefert still continues at much length recommending sulpho-carbonates. (pp. 694-7.)

M. F. Geyrand—On a method of applying alkaline sulpho-carbonates under ground by means of a tool, drawings of which he supplies. (pp. 701-2.)

Chemical note by M. C. Vincent, describing a new, simple, and cheap method of preparing sulphide of carbon. (pp. 701-2.)

Chemical note by M. Mercier—Describing a method of fixing sulphide of carbon, in drying oil—such as linseed. This is easily done: the substance is hardly inflammable at all; it can hold as much as seventy per cent. of sulphide, and will give it off as below, viz.: after twenty-four hours, twenty-four per cent. of its weight; after forty-eight hours, twenty-six per cent. of its weight; after seventy-two hours, twenty-seven per cent. of its weight.

Note by M. Foex—Note on a comparison of the roots of American and native vines; and on the depth of the lesions caused by the bite of phylloxera, on each; determined by micrometry. (pp. 922-3-4.)

M. Geoffroy, St. Helaire, suggests the leaves of eucalyptus globulus.

M. Gastine, on the determination of the diffusion of the vapors of sulphide of carbon as an insecticide in the ground. The material was injected into the ground in small quantities, and steps were taken to determine the breadth of the diffusion of the fumes and the duration of their presence. For this purpose the air was collected at varying distances from the holes of insertion, and made to pass into an alcoholic solution of potassa. The sulphide of carbon, in solution in the air is thus converted into xanthate of potassium.  $\text{CS}^2\text{X} (\text{C}^2\text{H}^3) = \text{C}^2\text{H}^5 \text{KCO}, \text{S}^2$ . The proof is that we can precipitate the xanthic acid as a xanthate of copper.

#### DISTANCES FROM THE SPOT WHERE IT WAS INJECTED.

March 1st, 0.30 metre; March 2d, 0.30 metre; March 3d, 0.70 metre; March 4th, 1 metre; March 5th, 0.60 metre; March 6th, 0.40 metre; March 7th, 0.25 metre.

The ground was moderately damp.

Experiments with like results were made in April, in both permeable and stiff clayey soils. (p. 1219.)

M. Boiteau—Note on the oviducts of phylloxera. (Microscopic work.)

#### COMTES RENDUS, JULY TO DECEMBER, 1877.

M. Boiteau, note 21st July, 1877. The beneficial effects of sulphide of carbon are now placed beyond all doubt, wherever it is used with

discretion and in proper quantities. The sulpho-carbonates of sodium and of potassium, the Rohart cubes, pure sulphur, sulphur mixed with coal tar, and the various mixtures devised this year, have all proved effective as far as they were employed in a reasonable way. What I have been looking for is efficacy of the material and economy in the use of it. My own preferences all are for the use of sulphide of carbon in its natural state, and what I learn from all quarters is that sulphide pure will soon supersede all mixtures hitherto proposed. (pp. 204-7.)

M. Max Cornu—A long note on a disease of the grapes in the vineyards of Narbonne—a fungus. (pp. 208-10.)

S. H. Macagno, Director of the Œnologic Station at Gattinara, Italy—A note on the same disease. Its effects were very destructive during the preceding four years in various parts of Italy. It is carefully described. (pp. 278, 279.)

M. F. Granet sends a note on the influence of the common field daisy in driving away phylloxera. (p. 333.)

M. L. Laliman reports an insect enemy of the phylloxera, and M. Balbiani determines it to be a *Syrphus*, the habits of which tribe have been admirably studied by Reausner, who called them "*Vers mangeurs de Pucerons*." (p. 507.)

H. Marés—Note on the spontaneous disappearance of phylloxera. Some experiments conducted on some vines in pots. Nothing conclusive. (pp. 564-5-6.)

M. Dupesnoy—Extract of a letter. He used pyrituous earth, used for the manufacture of alum, on sixty-five vines nearly dead, of which fifty-six recovered and are now quite healthy. (p. 608.)

M. L. Porte—Ravages of anthraenose or carbon in the vineyards of Narbonne. (pp. 704-5.)

M. C. Cassins—Preparation of sulphide of carbon as a solid, by the use of gelatine. (p. 748.)

M. F. Rohart claims priority in the above preparation. (p. 841.)

M. Boiteau—Various observations upon phylloxera. (pp. 932-3.)

M. A. Blankenhorn—On the natural enemies of phylloxera in Germany. (p. 1147.)

#### COMPTES RENDUS, JANUARY TO JULY, 1878.

M. Sabaté—Remarks on the advantage of removing the dry outer bark of the vine (*ecorcage*). (p. 105.)

M. C. Cassins—A note relative to the use of sulpho-carbonate of ammonia in gelatine. (p. 299.)

Agricultural Chemistry—On the production of sulphurated oils having insecticide properties. Note by Loyère et Muntz. (p. 1185.)

M. Portes' Letter—"I sulphur the whole vineyard every year. When, on the 10th of May, in the morning, while dressing the leaves of a young vine, three years old, I noticed that all the vines (*ceps*), without exception, were covered with a vast number of small white points, which I had not noticed the preceding evening, I removed some of them; and, on carefully examining them, I saw a black spot, hardly visible to the naked eye. I dusted over every part of the plants common sifted lime (*chaux grasse criblée*). Next day all the spots, both white and black, had disappeared. A modification of this was made by mixing the lime with sulphur.

## "OBSERVATIONS.

"1st. Vines attacked slightly last year are nearly free this year.

"2d. Vines completely ruined last year are this year free from spots; the vegetation is splendid and the fruit abundant.

"Between 10th May and 12th June these two operations were repeated three times. My experience is that sifted lime is the true remedy." (p. 1559.)

## COMPTES RENDUS, JULY TO DECEMBER, 1878.

Millardet—Note presented by M. Pasteur—A new theory of the damage done by phylloxera upon the roots of the vine. It attempts to show that a result of its action, besides producing nodosities and tuberosities, is the production of a fungus, whose mycelium is said to be always present, both in the bark and in the wood, and that is either the cause or the effect of the rotting. (pp. 197-8-9.)

M. Maxime Cornu—Millardet's suggestion is not new. M. Dupont suggested it in 1873. The consideration of it was suggested by the Commission of the Academy. Vide Comptes Rendus, 30th November, 1874, p. 1234. The mycelium has nothing to do about the vines, healthy or not, except only accidentally in the destruction of the swelling. (pp. 247-8.)

M. Ach. Livache—Note presented by M. Berthelot—On the abnormal solubility of certain substances in soaps and alkaline resins. In these matters sulphide of carbon might be dissolved. Probably of some use as an insecticide. (p. 249.)

M. E. Picon proposes the use of assafoetida as a remedy.

M. le Secrétaire Perpetuel, in noticing a brochure by M. Faucon, on the subject of submersion of vineyards, brought before the Academy the following directions, as given by Faucon, viz.: To be effective, the submersion must be conducted in conformity with the following rules, viz.:

*First*—Not to commence to run in the water until the wood of the tops is quite mature.

*Second*—The submersion must be complete, and not suffer the least interruption the whole time.

*Third*—The submersion must be continued during from thirty-five to forty days, if it be done in Autumn; and from forty-five to fifty days, if it can be done only in the Winter.

*Fourth*—It is essential that the water should have a minimum depth of from twenty to twenty-five centimetres; it would be still better if it covered the crown of the vine, just up to the spot where the pruning will be made.

*Fifth*—It is indispensable to manure with suitable substances. The more heavy the manuring the better the result, and the larger the yield of fruit and of the net products. "As to other details, I have," says M. Faucon, "nothing to add to my brochure of 1874."

M. J. Tabet proposes, or relates, a process of applying blood mixed with Palestine bitumen, diluted with olive oil. (p. 375.)

## JANUARY TO JULY, 1879.

M. Breton—Letter on the employment of the oil of asphalt. (p. 73.)

M. Dumas—A note on the preferential use of sulpho-carbonates. (p. 75.)

M. Boiteau addresses a very long letter to M. Dumas, on the action of sulphide of carbon on the root system of vines. (pp. 895-901.)

#### JULY TO DECEMBER, 1879.

M. Faucon to M. Dumas—A letter on the efficacy of submersion, giving evidence of it. (p. 80.)

Observations of M. Puel, communicated by M. Pootes to M. Dumas, on the treatment of anthracnose, in the vineyards of Narbonne, by the use of lime. (pp. 86-7-8.)

M. Millardet—A note on vine-root rot. MM. Schenzler and Planchon refer this fungus to the genus *Rhizomorpha*. Planchon thinks *R. fragilis*, Roth. —

M. Rohart—On the slow and prolonged action of the vapor of sulphide of carbon on the vine. (pp. 555-6.)

M. Pirotta—On the appearance of mildew, or false American oidium, in the vineyards of Italy. He refers it to *pérnospora viticola*. (Berk. et Curt.) It is well explained by Planchon, as regards France. (pp. 697-8.)

M. Boiteau reports finding two fecundated Winter eggs in the surface soil, both evidently alive, on 12th September. The first was attached to the underside of a small clod of earth. (pp. 772-3-4.)

M. Balbiani writes that the discovery of impregnated Winter eggs of phylloxera, by M. Boutin, is due to the circumstance of the insect being then and there pressed to lay her eggs, and not to any habit she has of selecting such places as a clod of earth, lying on the surface, for breeding. (pp. 846-7.)

M. J. Grison proposes fluoride of potassium. (p. 850.)

M. Valery Mayet—Observations upon the egg-laying of winged phylloxera, in Languedoc. (pp. 894-5-6.)

M. Mouillefert—A long note, detailing the beneficial effects of sulpho-carbonate of potassium, and upon the method of applying it.

## APPENDIX I.

## THE GRAFTING OF AMERICAN VINES.

[Synopsis of Practical Lectures on "Grafting of American Vines," compiled by the Central Agricultural Society of the Department of the Herault, and delivered in lectures by Prof. G. Foex, at the National Agricultural School of Montpellier, France, March 8th, 9th, and 10th, 1880. Translated from the French by Mr. E. W. Pailhet.]

## INTRODUCTION.

The following work must not be considered as a scientific treatise on grafting of American vines; it has simply been published to allow agricultural students who may attend the practical lectures delivered at the agricultural school to obtain a succinct synopsis of the instruction given them.

In fact, with our actual positive knowledge of this subject, it would be premature to give a definite exhibit of it, and to consider our instructions as absolute. The authors have tried to make a short and clear description of the processes most generally used, and which experience has justified the best. They hope that, owing to the activity with which the knowledge of grafting is now being acquired, this publication will soon be far behind in improvements that may be made. They only hope it will be of some use at present, and be the starting point of great and rapid improvements in the future.

## CHAPTER I.

## PLANTS ON WHICH VINES CAN BE GRAFTED.

The vine can only be grafted on the vine. Grafts which have been tried on the mulberry, clematis, blackberry, *vigne vierge* (*ampelopsis*), etc., have produced no results up to this day.

## SELECTION OF VARIETIES OF AMERICAN VINES WHICH GIVE THE BEST RESULTS AS GRAFTING STOCK.

It is demonstrated by all the experiments made up to this date on American vines, that all, with the exception of the *Scuppermong*, will bear grafts of our vines. Experience has not yet proved definitely the value of the different varieties of vines in this point of view. The various varieties of the *Riparia* group (formerly *Cordifolia*) are at present selected in preference to all others as graft bearers, on account of their small price and the easy rooting of their cuttings; nevertheless, certain *Aestivalis*, such as the *Jacquez*, the *Cunningham*, the *Herbemont*, etc., make very good stocks, and can be easily utilized when they can be had with roots without too much difficulty, or in using the internode grafting process of Mr. Champin.

The most valuable variety amongst the *Riparia*, on account of its



vigor, which allows it to grow easily in many places, is the wild *Riparia* (formerly wild *Cordifolia*.)

#### VALUE OF AMERICAN STOCKS AS GRAFT-BEARERS FOR CERTAIN OF OUR VARIETIES.

This question, like the preceding, is now being carefully studied, and it is rather difficult to give a definite opinion concerning it; however, fine grafts of *Aramon*, *Carignane*, *Petit Bouschet*, *Verit noir*, *Cinsaut*, *Morristel*, etc., have been observed on the *Clinton*.

It has been noticed that the *Aramon* has not given as good results on the *Taylor* as on the *Clinton*, but that the other French stocks mentioned above, and especially the *Terret Bourret*, the *Chasselas*, the *Muscat*, the *Olivette*, have prospered well on it.

The *Solonis*, seldom grafted upon to this date, supports the *Petit Bouschet* very successfully.

Excellent results have been obtained on the wild *Riparia* with the *Aramon*, the *Carignane*, the *Aspiran*, and the *Cinsaut*.

We have found the same good results on the *Herbemont* with the *Aramon*, the *Carignane*, and the various varieties of hard wood.

The *Jacquez*, which has been but little used for this purpose, has fine prospects as a graft-bearer of our various varieties, and amongst them of the *Aramon*.

#### AGE AT WHICH THE STOCK CAN BEAR THE GRAFT.

When the cuttings are of a proper size, they can be grafted the year after planting them. In this case the English cleft-graft should be used, and fruit may be produced the third year after the planting of the cutting.

Grafting may also be made either on ordinary cuttings before planting them, or on *internodes*, or rooted plants. Unfortunately, these last two ways of proceeding, which have given very satisfactory results in certain cases, have not succeeded as well as the first, when in our climate their use is generalized. In suitable spots, grafts made on cuttings will have the advantage of furnishing stocks which, when planted in a nursery, and replanted the following year, with the part where they have been joined placed above the ground, will be in a good condition to avoid the chances of being broken apart.

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## CHAPTER II.

#### SELECTION OF THE GRAFT—SIZE AND APPEARANCE OF THE CUTTINGS.

The cuttings fit for being used as grafts must be selected from healthy and good bearing stocks. They must be well ripened by the Summer heat, provided with all their eyes, be of middling size, and contain little pith. These last conditions, which are met with in cuttings from old stocks, are important to follow, as then the wood is less apt to split when the graft is driven into the cutting, and the growth of the graft more certain. With cuttings from young stocks, which are softer and more easily dried, the chances of success are much smaller.

## SEASON FOR MAKING THE CUTTINGS.

To be sure of successful grafting, the grafting stock should be in advance of the graft in progress of vegetation, and for this reason it is necessary to gather before the rising of the sap all cuttings that are to be used as grafts. This work must be done, at the latest, before the beginning of February.

## HOW TO PRESERVE THE GRAFTS.

The cuttings chosen to be used as grafts are to be kept in places where they will neither dry nor be injured by the damp atmosphere, which would occasion vegetation. To realize these conditions, you can proceed as is done in the Herault, where the grafting stock is kept in cellars, and covered with sand, or bound in small bundles, which are placed upright in a trench of four and a half to six feet deep. This trench must be made under cover, or on the northern side of a high wall, and the cuttings buried in sand and covered with damp earth. When removed from the trench, they should not be kept in contact with the air, as they will dry much quicker than in ordinary circumstances.

## HOW TO ASCERTAIN THE VITALITY OF THE GRAFTS.

When, after making a section of a cutting, the green layer under the bark is found dried or blackened, it is very probable that it has lost its vitality. The most accurate way of judging the quality of the graft is to place some of them, picked here and there in the bundles, in a vessel full of water, and to leave them for a few days in a temperate atmosphere, in the sun if possible. If the buds swell and open, or if water beads on the end of a section made on the upper part of the cutting, you can be sure that the cuttings are in a good condition to be retained.

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 CHAPTER III.

## SEASON FOR GRAFTING.

As a rule, grafts after being made ought to join quickly together; now, as the connection of the graft will only begin at the time when the sap runs, it is preferable to wait for that time. Grafts made too soon run risks which it is important to avoid; the uncovered tissues will dry, or undergo, according to atmospherical circumstances, other alterations which will prevent their connection; and besides, the Spring frosts may, in destroying the buds, or in suddenly stopping the vegetation, greatly compromise the future of the work. It is generally during the end of the month of March and in the month of April that grafting succeeds the best in our part of the country. If many failures were made in the year 1879, in the work done at that time in the Herault, they must be considered as the result of the exceptional amount of wet, cold, and frosty weather.

## FAVORABLE CIRCUMSTANCES FOR GRAFTING.

The best time to choose for this work is cloudy and temperate weather, but without rain, and it is important that the soil should be well mellowed to facilitate the earthing up of the soil around the plant.

## CHAPTER IV.

## SYSTEMS OF GRAFTING ADAPTED TO THE VINES.

Practically, grafting can only be done underground—grafts made above the ground seldom prosper, as the action of the air generally dries the parts in contact before they join together. Experience has also demonstrated that the various systems of cleft grafting are preferable to grafting by approach.

The best known amongst the former systems of grafting are: *The common cleft graft—graft à la Pontoise or by incrustation. English cleft graft—Champin—Fermaud heel graft, etc.*

## ORDINARY CLEFT GRAFT (FIG. 1.)

To make this graft the stock is bared to facilitate the work, then it is cut at one or one and a quarter inches underground, and the part where the graft is to be placed slightly trimmed with a pruning knife. The cleft is then made with a chisel, manufactured for the purpose, or simply with a pruning knife if the stock is not too large. In the first case the chisel is placed a little back from the edge of the stock (fig. 1a) and when the cleft is ready its exterior part is widened as far as the chisel by cutting out of the cleft two small slips of wood just large enough to make a cavity to allow the graft to be tightly inserted.

Three eyes are left on the graft, and it is cut into the shape of a knife-blade (fig. 2), the two bevelings starting from the base of the lower eye. One should avoid as much as possible uncovering the pith on both sides, so that more solidity may be preserved in the part which has been trimmed. The graft is then firmly inserted into the cleft, slanting it a little in such a way as to have a place where the bark of both intersect each other notwithstanding the difference in their size. Then the chisel, which in the second part of the operation has been used to keep the cleft open, is removed.

This system of grafting is more especially applicable to stocks of a certain age, and consequently of a pretty large diameter. As for those of a smaller size, where the wood is not sufficiently elastic to hold the graft with security, the cleft is only made on one side, with a pruning knife (fig. 1b).

Under the same conditions, the graft known as the *graft à la Pontoise* can be used, the only difference being that instead of splitting the stock, it is hollowed with a pruning knife, or a gouge made especially for that purpose, making a cavity to insert the graft (fig. 3).

## THE ENGLISH CLEFT GRAFT.

To make this graft it is necessary to cut the stock sloping at the

level of the ground with a pruning knife, or one made for that purpose, and split it again vertically at the upper third part of its diameter. The graft is cut in the same manner, and the loosened tongues mutually inserted in the slips, but it is necessary to make the barks coincide as well as possible, at least on one side (fig. 4), as it may often happen that the graft is of a smaller diameter than the stock. The parts are afterwards kept in contact with a tightly fastened ligature.

#### THE CHAMPIN GRAFT (FIG. 5),

Is a modification of the English cleft graft. It is made in the following manner: The stock cut perpendicularly to its axis is split to about two thirds of its diameter, and the thickest part cut in an elongated bevel up to the higher part of the slit. The same is done with the graft, which is wedged and bound in the manner which we have already described.

These two last processes have the benefit of being applicable to young plants of a diameter which does not much exceed that of the cuttings used as grafts. Sprouts, or internodes rooted by layering, and the ordinary cuttings, can be utilized, and, in certain cases, by these means excellent results can be obtained. The work can also be done indoors during most of the Winter, but it is necessary to cover the grafted stocks with a thick layer of sand, as the grafts are made, to preserve them up to the time of planting them.

#### GREFFE Á TALON.

This sort of graft is done in the following manner: The stock is cut and split in the same way as in the common cleft-grafting, the graft carefully selected of a slightly curved shape, and provided with a heel (*talon*), is edged off in the middle and on both sides in the shape of a knife blade (fig. 7); it is then inserted into the cleft in such a manner as to make the barks correspond exactly and have the *talon* placed in a good position to root. (Fig. 6.) Mr. P. Fermaud has modified this former process. The stock is cut and split, and a portion of the wood forward of the cleft is removed with a gouge made especially for the purpose of making a sharp bevel on one of the sides. At about the lower third of the graft a tongue of wood is detached and the bark removed to the outer side, and it is then inserted into the cleft and the full thickness is wedged into the cavity.

The last two systems of grafting are intended to guarantee a certain prolongation of life to American grafts, if persons using them are desirous to grow shoots in a short time in utilizing the little vitality left in the French stocks diseased by the phylloxera, but which are still partially productive.

#### GRAFT BY APPROACH, MADE ON RIPENED WOOD.

This graft has not, up to this date, given many good results, and it is seldom used on account of the poor vegetation which follows after the graft is deprived of its root. The grafts made by herbaceous approach (*approche herbacée*), though not much known, are recommended by Mr. Comy, of Garons (Gard), who has been very well satisfied with their use. They are made in the following manner: The first year a French cutting and an American one are planted side by

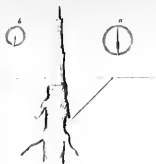


Fig. 1—Ordinary cleft graft.



Fig. 2—Cut of the grafting piece for the ordinary cleft graft.



Fig. 3—Pontoise graft.

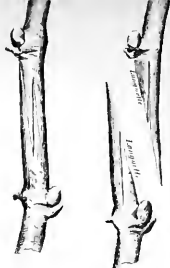


Fig. 4—English cleft graft.



Fig. 5—Chiseling graft.



Fig. 6—Rooting graft, called the heel graft.



Fig. 7—Cut of the grafting piece for the heel graft.



Fig. 8—Tommy's berberaceous graft.

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side at a distance of about four inches of each other. The following year the eyes of the two plants (*saplings*) which are the nearest to the soil are covered with earth. Strong shoots grow from the plants, and two of these shoots, the most easy to be brought together, are selected. Then the American shoot is wedged off and a small incision made with a grafting knife on the French shoot (cutting, fig. 8). The former shoot is inserted into the cleft made in the latter; they are tied together, earthed up, and finally the French shoot is pinched (*pincé*) at the place where the arms (*bras*) of the stock are to spread from.

The binding used by Mr. Comy is made of flat India rubber, fourteen hundredths of an inch wide, and from two to two and a half inches long. When it is not made too tight it allows the growth of the herbaceous part without strangling. A few weeks after this work the graft is separated by cutting the French plant under its point of contact with the American stock.

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## CHAPTER V.

### TOOLS AND GRAFTING MACHINES—TOOLS FOR CLEFT GRAFTING.

The tools used in cleft grafting are, first, a saw with an iron bow, or a common gardener's saw, to cut the stocks of large size. Second, pruning shears for smaller stocks. Third, a steel chisel similar to a cold chisel; or, in preference, a chisel having the shape of the blade of a knife; this has the advantage of opening the stock more at the outside than at the center. Fourth, a common hammer; or, in preference, a hammer with one side like a pickaxe; this is used to drive the chisel into the wood and to remove the earth from the stock which is to be grafted. Fifth, a pruning knife, to trim the graft, make the cleft on the young stocks, and prepare the grafts.

### SPECIAL TOOL USED FOR THE PONTOISE GRAFT.

For this graft an angular bladed gouge is often used to open the sharp-edged groove in which the graft is wedged.

### GRAFTING INSTRUMENTS USED FOR CLEFT AND CHAMPIN GRAFTING.

Many instruments may be used to make these two kinds of grafts indoors; these may be seen at the agricultural fair, so I will not describe them to you.

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## CHAPTER VI.

### FASTENING AND GLUEING.

Grafts made on stocks of small diameter must be strongly fastened with ligatures which keep tight up to the time when they are sufficiently joined together; cord and Japanese raphia (*raphia*) are more specially used for this purpose. The latter is cheaper and stronger,

but it rots easily in wet seasons; this can easily be overcome by bathing it in sulphate of copper for a short time before using it.

Wire has also been tried, but having little or no elasticity, it has the great inconvenience of strangulating the graft often before people think of removing it. It can only be used in cutting grafts, as they do not grow much the first year.

Wool is often used in grafts made above ground, but is easily rotted by dampness when used in the ground.

The best preparation to inclose the graft and protect it, so far, is prepared clay. A small quantity of it is applied on the graft to protect it from the contact of the air and water. The clay must be entirely free from gravel, and consist in a well kneaded paste, which will neither run nor crack when it is worked.

## CHAPTER VII.

### NECESSARY CARE TO BE GIVEN TO THE GRAFTS AND EARTHING UP (BUTTAGE.)

The graft once finished must be earthed up or staked. The earth, well prepared beforehand, is put around the graft, forming a sort of a cone, and allowing the last eye only to be above the ground. This work is done with a *tringue* or triangular hoe, and must be done carefully so as not to shake the graft.

### REMOVAL OF THE FRENCH ROOTS AND AMERICAN SHOOTS.

It is necessary to examine the grafts about every twenty days, or every month during the Summer, to destroy all the roots which have grown on the graft, and remove the suckers which start from the stock. The success of the grafts often depends on the careful manner in which this work is done; in fact, when the roots of the graft are allowed to grow, the vegetation of the graft-bearer decreases and the outside part in the air grows quicker than the part in the ground. This abnormal growth causes the disjunction of the sides of the cleft and often occasions a complete separation of the graft.

A fact of this nature was observed this year in a vineyard near Montpellier, on a large quantity of *Herbemonts* grafted with *Aramons*, *Aspirans*, and *Carignanés*, whereas, in an entire row, where the plants had been inspected with care, no accident of this kind was noticed. Besides, the freeing of the grafts is always injurious, as their roots are destroyed in a very short time by the phylloxera.

When the suckers are neglected to be removed, the chances are that they will increase to the prejudice of the buds of the graft. After the month of August, when the successful plants can be recognized, the cutting of the suckers is stopped, to keep a reserve, if needed, of shoots on which grafts can be made the following year. In case these second shoots should not be plentiful, it is almost always possible to make another graft on the lower part of the stock.

### THE CALENDAR FOR GRAFTING.

*January and February*—Gathering and storing of the grafts; mak-



ing of the grafts on cuttings and rooted stock; burial of the grafts in the sand.

*March*—Continuation of the latter work; beginning the field grafting.

*April and first fortnight in May*—Continuation of field grafting; planting of the grafts made indoors during the former months.

*June and July*—Inspection of the grafts for the removal of the roots and suckers. After the fifteenth of June begins the grafting by herbaceous approach of Comy.

*August*—Continuation of the inspection of the grafts. Reserve of the second suckers on the stocks on which the work failed in the Spring; separation of the rooted end of the herbaceous grafts made in June.

*September*—Continuation of the work done in August.

#### APPENDIX.

Many vineyards near Montpellier have given very interesting results in grafting French stocks on American vines. Among these, viz.:

Mess. Pagezi, at Vivier, with *Aramons* on *Clintons*.

— Julian, at Villeneuve; *Chasselas* on *Taylor*.

Mrs. Fabre, at St. Clement; *Aramon*, *Petit-Bouschet*, *Carignane*, *Chasselas*, *Joannene* on *Riparia*, *Clinton*, *Taylor*, *Herbemont*, and *Cunningham*.

Mess. Cancel, at St. Gely-du-Fesc; *Cinsaut* on *Clinton*.

— De Turenne, at Vallotre, near Pignau; *Aramon* and *Carignane* on *Clinton*, *Taylor*, and *Riparia*.

— E. Courty, at St. Georges d'Orgues; *Aramon* and *Carignane* on *Clinton*.

— Ferrouillat, at S. Georges; *Cinsaut*, *Oeuillade*, and *Aspiran* on *Clinton*.

— Des Hours, at Manguio; *Aramon* on *Clinton* and *Concord*.

— Bouscaren, at the Terral; *Aramon*, *Cinsaut*, *Chasselas* on *Taylor* and *Clinton*. Grafts of different kinds.

— Saint Pierre, at Rochet, near Castelnau; *Aramon*, *Petit-Bouschet*, and *Cinsaut* on *Solonis* and *Clinton*.

— Arnal, at Lavèrune; *Aramon* and *Petit-Bouschet* on *Clinton*.

— Vialla, at Saporta, near Montpellier; *Aramon* and *Carignane* on *Cunningham*, *Herbemont*, and *Jacquez*.

— Ernest Leenhardt, at the Chalet, near Montpellier; *Aspiran* on *Clinton*, *Carignane* on *Herbemont*.

— Blouquier, at the Mas-de-Farel, near Manguio; *Aramon*, *Cinsaut* and others on *Concord*.

— Sabatier, at Morin, near Montpellier; grafts of different kinds.

— Gordon, at St. Georges; *Cinsaut* and *Aspiran* on *Clinton*.

— Loubet, at Montpellier; different French stocks on *Clinton*.

— Delon, at Labruyère; *Terret* and *Aramon* on *Clinton*.

## APPENDIX J.

## THE PHYLLOXERA IN PORTUGAL AND AUSTRALIA.

[Translations and abstracts made by Dr. J. I. Bleasdale, Secretary of the Viticultural Commission of California.]

## PHYLLOXERA IN THE PORT WINE PROVINCE OF PORTUGAL.

The effects of phylloxera began to appear, while the cause was unknown, in Portugal, about the same time as in France. It was first observed in the parish of Gouvinhas, in the Commune of Sabrosa, District of Villa Real, in the very heart of the country which produces port wine. There, as has generally happened in other recent centers of infection, the damage done by it for the first few years was of no great consequence, but after awhile it became extraordinary. In 1865 this property produced seven thousand gallons of wine, and in 1872 the yield was only one hundred and six gallons.

At short intervals other places were observed to have been attacked, but without awakening the attention which the importance of the evil demanded. Consequently it is now impossible to denote step by step the course of its progress, while its spread has been extraordinary, and rendering at the same time the demarcation of all the numerous affected spots all but impossible.

However, the affected localities were confined to the vineyard districts of the Douro until 1878, the period at which spots were discovered where phylloxera had been at home a long while, in the Communes of Macedo and Mirandella belonging to the district of Braganza. On the map of Portugal the infected country extends from Villa Real and Alijo north to Lamego and San Joas da Pasqueira south, and the surrounding districts. As to the center part—the district of Sabrosa—it is utterly destroyed.

The produce of the Douro is now, June, 1880, reduced to two thirds, *i. e.*, by nearly thirty thousand pipes; of money value, one million of dollars, and the corresponding capital disappears along with the vineyards.

After careful investigation into the extent and virulence of the attack, the Commissioners have decided to recommend carbon bisulphide as the only curative and protective remedy, and to accomplish those ends they, with aid from the government, have established a factory for the manufacture of it on an extensive scale.

## PHYLLOXERA IN VICTORIA, AUSTRALIA.

Three years ago phylloxera was discovered in a small vineyard near Gelong—the first established vineyard district of that State. As it was at that time confined to only one or two other small properties there was no difficulty about tracing its origin. Five years previ-

ously Mr. Dardell, the proprietor of the vineyard, had paid a visit to France and brought back with him a small parcel of plants or cuttings. Thus the pest was introduced. No sooner was it ascertained to be the true *phylloxera-vastatrix* than the Legislature, then in session, passed a stringent Act for the suppression of it, giving power to quarantine, and even to eradicate vines and destroy vineyards. But the administration of the Act, and the exercise of the powers granted under it, were placed in the hands of the Secretary of the Department of Agriculture and two proprietors of vineyards. The consequence has been, as might have been expected, that the Secretary had too much else to attend to, and the work of stamping it out was left to the other two Commissioners, themselves interested in vineyards.

Some remedies were tried for a time and failed. Then the ultimate means were had recourse to, and one vineyard at least, belonging to Mr. Wyatt, was rooted up. But still it spread to other vineyards, and continued to spread. At present a select committee of the Legislature is inquiring into the extent to which it has spread, and other matters affecting its development and arrest.

What is very interesting to the California vineyard proprietor is the fact, deposed to by both Mr. Wyatt, an intelligent and close observer, and the Secretary of Agriculture, Mr. A. R. Wallis, that on the rootlets of vines left in the ground when Mr. Wyatt's vines were uprooted, three years ago, the phylloxera was found so late as last November. These facts are reported among other depositions taken on the 24th of November by the committee of the Legislature. The carbon bisulphide is about to be tried as a curative measure in that State.



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SESSIONS

OF THE

**Board of State Viticultural Commissioners.**

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# SESSIONS OF THE BOARD.

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## MINUTES OF THE PROCEEDINGS OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS.

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FIRST MEETING FOR ORGANIZATION, MAY 24, 1880.

The following named members of the Board of State Viticultural Commissioners met at two o'clock and fifteen minutes P. M., May 24, 1880, at the office of Mr. Chas. A. Wetmore (one of the members), No. 111 Leidesdorff street, San Francisco, for the purpose of organizing the Board:

Isaac De Turk, Commissioner for the Sonoma District.

Charles Krug, Commissioner for the Napa District.

Arpad Haraszthy, Commissioner for the San Francisco District.

L. J. Rose, Commissioner for the Los Angeles District.

R. B. Blowers, Commissioner for the Sacramento District.

Geo. West, Commissioner for the San Joaquin District.

J. DeBarth Shorb and Chas. A. Wetmore, Commissioners for the State at large.

G. G. Blanchard, Commissioner for the El Dorado District, sent word that he was unable to attend, owing to a press of business engagements.

The meeting was temporarily organized by the election of Mr. L. J. Rose, temporary President, and Mr. Chas. A. Wetmore, temporary Secretary.

The Commissioners present qualified by subscribing to the oath of office; which oaths, duly certified, the Secretary was subsequently instructed to forward to the Secretary of State.

Permanent officers were thereupon elected, as follows:

President—Arpad Haraszthy.

Vice-President—Chas. A. Wetmore.

Treasurer—Chas. Krug.

The vote in each case was unanimous—no other nominations being made. The election for Secretary was postponed till next day.

Lots for the long and short terms were then prepared, and each member present drew once, leaving the ninth lot for Mr. Blanchard, who was absent, as follows:

Commissioners for two years—Arpad Haraszthy, R. B. Blowers, J. DeBarth Shorb, and Chas. Krug.

Commissioners for four years—Geo. West, L. J. Rose, Isaac De Turk, Chas. A. Wetmore, and G. G. Blanchard.

The bond of the Treasurer was fixed at eight thousand dollars, (\$8,000), to be signed by two sureties, who shall be freeholders in this State. The bond of the Secretary was fixed at fifteen hundred dollars (\$1,500), to be signed by two freeholders, as sureties.

It was directed that these bonds should be made out in duplicate, and be transmitted to the Committee on Finance, when appointed, and after approval by said committee, to be filed by the Executive Committee, one of each with the Secretary of State, and one with the Secretary of the Board.

Mr. Shorb was appointed a committee of one to confer with the officers of Wells, Fargo & Company, to ascertain what facilities the Board might obtain for transmission of samples of wines and other products for the use of the Board in San Francisco.

Mr. Wetmore was appointed a committee of one to prepare a report upon the law under which the Board was appointed, defining its work and its duties.

The Board then adjourned until eleven o'clock A. M., May 25th.

SAN FRANCISCO, May 25, 1880.

The Board of State Viticultural Commissioners met at No. 111 Leidesdorff street, pursuant to adjournment, at eleven o'clock A. M.

Present: President, Arpad Haraszthy, Messrs. De Turk, Krug, West, Rose, Blowers, Shorb, and Wetmore. Absent: Mr. Blanchard.

The President presided, and Mr. Wetmore continued to act as Secretary pro tem.

Mr. Shorb reported favorable progress in the matter of transportation facilities.

Mr. Wetmore reported concerning the duties of the Board, submitting notes for the consideration of the Commissioners.

The following named gentlemen were announced by the President as applicants for the position of Secretary, viz.: Dr. L. J. Morse, Ignacio Brown, Dr. T. A. Lockwood, J. Ward, Jr., Manuel Eyre, and Rev. John I. Bleasdale, D. D., F. G. S.

By an unanimous vote, Dr. Bleasdale was elected Secretary. His salary was fixed at one hundred (\$100) dollars per month.

The Secretary elect was then sent for. He appeared before the Board, accepted the office, and was at once installed.

The Secretary having taken his seat, the business of the Commission was proceeded with, and the following appropriations were made, viz.:

Salary of Secretary, per year-----	\$1,200
Rent of rooms, per year-----	500
Furniture, per year-----	400
Members' traveling expenses, according to law, per year-----	210
Lectures, per year-----	350
Phylloxera investigation, printing, stationery, and incidental expenses, per year-----	1,340
Total -----	\$4,000

The first annual meeting of the Board of Commissioners was appointed to take place the second Monday in December, 1880, at eleven o'clock A. M.

In future the semi-annual meetings will be held on the second Monday in June, each year, and on the second Monday in December.

It was also decided to hold a special meeting in San Francisco on the second Monday in August next.

Other special meetings may be called by requisition, signed by any five members, to be held fifteen days from the date of such requisition.



tion; the business to be transacted at such special meeting to be specified in the notice sent to the Commissioners, and none other entered upon.

The bonds of the Treasurer and Secretary were directed to be filed with the State Treasurer, at Sacramento.

*Committees Appointed*—Executive: Chas. A. Wetmore, Geo. West, Isaac De Turk. Auditing: R. B. Blowers. Finance: Louis J. Rose and J. De Barth Shorb. Phylloxera, Vine Pests, and Disease of Vines: I. De Turk, Geo. West, Chas. Krug, and R. B. Blowers. Conference with Board of Regents of the State University: A. Haraszthy, Chas. A. Wetmore, and Chas. Krug.

*Duties of the Executive Committee*—To exercise a general supervision over the work of the Commission; to select rooms and furniture; to select lecturers and pay them as directed by the Commission.

*Finance*—To examine accounts of Treasurer.

*Auditing*—To audit all accounts.

No committee to contract debts, except as directed by the Board.

The Board was informed by a communication from the Secretary of the Board of Regents of the State University, that the following named Regents had been appointed a special committee, on behalf of the University, to coöperate with the Board of Viticultural Commissioners: Honorable B. B. Redding, Honorable H. M. LaRue, John L. Beard, Esq., and Honorable John Bidwell.

#### DUTIES OF DISTRICT COMMISSIONERS.

They shall each report annually upon viticulture in their respective districts, as they may deem best for the promotion of viticultural industries, which reports shall include district statistics. Each report shall be prepared for publication in the name of the Commissioner who is its author, and shall contain a statement of the results of his experience and research, together with his recommendations and advice.

Each District Commissioner shall determine the times and places for holding viticultural meetings in his respective district, with full power to hold one or more, as he may think best, and shall report such times and places to the Executive Committee one month before holding the same, so that due public notice may be made throughout the State. The special subjects to be discussed at such meetings shall be stated in advance, and due notice given to the public.

They shall have power to hold local viticultural fairs and exhibitions at their discretion, and shall preside over, or appoint a substitute to preside over, all such district meetings and fairs.

They shall endeavor to enlist experienced viticulturists and experts in the work of imparting information; shall preserve as much as possible all important communications, addresses, and documents for the use of the Board, and shall transmit, whenever possible, copies of printed addresses, lectures, and documents relating to viticulture to the Executive Committee.

They should assist in organizing local viticultural societies, whenever practicable in their judgment, and endeavor to promote harmonious relations between such societies throughout the State, and secure their active coöperation with the State Board of Commissioners.

They shall also make known to members of the State Legislature,

members of Congress, United States Senators, and United States revenue officers residing in their respective districts, the wants of viticultural industries.

No District Commissioner shall contract any debts or liabilities for which this Board shall become responsible, unless duly authorized to do so.

#### DUTIES OF COMMISSIONERS FOR THE STATE AT LARGE.

They shall report annually, at the same time required of District Commissioners, on topics of general interest to viticultural industries, and especially concerning the uses and abuses of wines and spirits, transportation, and general legislation; and shall arrange for the collection and analysis of wines and spirits, domestic and foreign, and report concerning adulterations and means for preventing the same.

#### PHYLLOXERA AND VINE PESTS.

The Committee on Phylloxera, Vine Pests, and Diseases of the Vine, was instructed to institute special inquiries and investigations, with the aid of assistants in the fields of observation.

The matter of publishing a series of text-books, or pamphlets, giving elementary instructions in viticulture, was postponed until the next meeting.

It is anticipated that assistance in procuring accurate statistics may be obtained through the Enumerators for the Census and the County Assessors. The intention is to prepare charts of the State, showing the exact location of all the vineyards now planted, and so colored as to indicate qualities of soils and adaptation of different districts for viticulture.

#### OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS, } SAN FRANCISCO, August 9, 1880. }

A special adjourned meeting of the Board of State Viticultural Commissioners was held on August 9th and 10th, at the new offices in this city, No. 526 Montgomery street, at two o'clock P. M.

Present: Arpad Haraszthy, Esq., President; R. B. Blowers, Isaac De Turk, Charles Krug, George West, L. J. Rose, Chas. A. Wetmore, and the Secretary, Dr. John I. Bleasdale.

Absent: Commissioners Shorb and Blanchard.

A review of the work of the standing and special committees was presented for approval.

The Special Committee on Phylloxera, Vine Pests, and Diseases of the Vine, reported progress, the substance of their initiatory proceedings at Sonoma having already been made known.

Mr. Wetmore reported that he had, in conjunction with Professor Hilgard, of the State University, selected Mr. F. W. Morse, of the University, to proceed to the different vine-growing sections, and to report simple data, based on observation, inquiry, and experiment concerning vine diseases, for the consideration of the Board and Professor Hilgard. He is to report simple facts for the use of the Board and the University. His attention is directed not to phylloxera alone, but to all oidium, black knot, thrip, and other diseases and pests.

By request of the Chairman of the Committee on Phylloxera, Vine Pests, etc., Mr. Wetmore was added to the committee, and was instructed to obtain, by correspondence, a statement of the best methods of resisting the phylloxera, known in France, and especially the cost and method of applying the sulphide of carbon; also, the cost and method of manufacturing the same; also, samples of implements used in applying the sulphide.

Letters were read addressed to Messrs. West and Wetmore, from Stockton, relative to the practicability of obtaining seeds and plants of the Cuhach (*pyrethrum cinevarie folium*) to cultivate in vineyards, as an additional protection against insects. It seemed to the Commission practicable to obtain and cultivate the plants.

The Commission then adjourned to ten o'clock A. M. next day.

On the following day, August 10th, the Board assembled at ten o'clock A. M.

Commissioners present: Chas. A. Wetmore, Vice-President, presiding; L. J. Rose, I. DeTurk, R. B. Blowers, George West, and later A. Haraszthy.

#### RESOLUTIONS ADOPTED.

On motion, by Mr. Rose, the following resolution was unanimously adopted, after considerable discussion:

*Resolved*, That it is the belief of the Viticultural Commission that it is of the first importance to maintain the purity of our wines and brandies, and to make the matter as self-evident as possible throughout our country, and in view of this fact it is the sense of this Commission that an important step in this direction would be taken if it were a requirement of the Internal Revenue Department that all brandies made from grapes and other fruit in the United States should be sold in original packages, with the tax paid stamp attached, and that all laws permitting the sale of fruit brandies under a rectifying or wholesale liquor dealer's license be repealed; also, that it be permitted to have five-gallon packages, and that tax stamps be issued for this purpose. That our Representatives and Senators of this State be asked to help us secure the passage of such laws and regulations as will carry out these changes; also, that it is desirable to have a distinctive color for stamps for brandy made from grapes. That all grape-growers and distillers be asked to aid in this matter by signing a petition to Congress; also, that it is of vital importance that all grape and fruit brandies be permitted, under existing regulations, to be entered for storage, and be moved from one to another of any of the bonded warehouses in the United States; *provided*, that this shall not interfere with the present system of special warehouses.

On motion of the President, and seconded by Mr. Rose and carried:

*Resolved*, That the Treasurer be instructed to pay to the Chairman of the Special Committee on Phylloxera, Vine Pests, and Diseases of the Vine, the sum of one hundred and fifty dollars (\$150), to be used by said committee in defraying expenses of their investigations in the field, not including any personal expenses of said committee.

On motion of Mr. Rose, seconded by Mr. Blowers:

*Resolved*, That the Treasurer be instructed to pay to the Chairman

of the Executive Committee the sum of fifty dollars (\$50), to be used in defraying contingent expenses of the committee and of the general office of the Board, not including any personal expenses of any member of the committee.

On motion of Mr. DeTurk, seconded by Mr. West:

*Resolved*, That the thanks of this Board are tendered to Dr. Hermann Behr, for his able and instructive lectures on the Phylloxera, delivered at the Sonoma District Viticultural meeting, held on the twenty-third of July, at Sonoma, and it is the intention of the Board to preserve the same for future publication.

On motion by Mr. L. J. Rose, seconded by Mr. Chas. A. Wetmore:

*Resolved*, That the thanks of this Board be tendered to our Secretary, Dr. J. I. Bleasdale, for his contribution of the use of his laboratory and scientific works and instruments in furthering the work of his office.

On motion by Mr. West, seconded by Mr. Krug:

*Resolved*, That the following should in future be the order of transacting business at the meetings of the Board, viz.:

1. Roll call.
2. Reading of minutes.
3. Reports of standing committees.
4. Reports of special committees.
5. Correspondence.
6. New business.
7. Unfinished business.

On motion by Mr. Krug, seconded by Mr. Blowers:

*Resolved*, That the Commission request the Board of Regents of the State University of California to assist them in the matter of investigating phylloxera, etc., and to that end allow Prof. Hilgard a sum similar in amount to that allowed by the previous resolution of the Commission, viz.: one hundred and fifty dollars.

#### SEMI-ANNUAL MEETING OF THE STATE VITICULTURAL COMMISSION.

The semi-annual meeting of the Board of State Viticultural Commissioners was held on the thirteenth of December, at their office in San Francisco, No. 526 Montgomery street, the following members being present: Arpad Haraszthy, President; I. DeTurk, R. B. Blowers, George West, L. J. Rose, G. G. Blanchard, and Chas. A. Wetmore. Absent—Chas. Krug and J. DeBarth Shorb.

Reports were submitted by the following Commissioners, viz.: Charles A. Wetmore, Chairman of the Executive Committee; by I. DeTurk, Chairman of the Committee on Phylloxera, Vine Pests, and Diseases of the Vine; also, by Messrs. Haraszthy, Blowers, DeTurk, and Rose, for their respective districts.

The Phylloxera Committee's report was voluminous, and contained matter of original research, and full abstracts and translations from French reports. It was ordered printed.

In consequence of the limited funds for printing and publishing the report of the Commission, it was resolved that only two thousand copies should be printed for the use of members of the Legislature, and distribution by the Board. A Printing Committee, consisting of

Messrs. Haraszthy, Wetmore, and De Turk, were appointed to superintend the printing of the report.

The resolution of last meeting offered by Mr. Commissioner Rose, and passed, relating to stamps on brandy, was amended by an addition, as follows:

"That parties placing brandy made from grapes in any bonded warehouse, be allowed, under proper regulations, and under the supervision of the keeper of the bonded warehouse, to fill smaller packages out of larger ones, and that such packages shall have the tax-paid stamps attached the same as the original packages. It is, however, understood that as much revenue shall be paid as would be required if the refilling of small packages had not taken place, and that all expenses be defrayed by the owner of the brandy."

Moved by Mr. Rose, seconded by Mr. Blanchard:

"Resolved, That the following Commissioners form a Committee on Legislation, viz.: Messrs. West, Rose, Blowers, Wetmore, De Turk, and Blanchard, any two to form a quorum.

JOHN I. BLEASDALE, Secretary.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS, }  
SAN FRANCISCO, Cal., March 10, 1881. }

A special meeting of the Board was held this day. Present—Commissioners Arpad Haraszthy, I. De Turk, Charles Krug, R. B. Blowers, George West, G. G. Blanchard, Charles A. Wetmore, and the Secretary, Dr. J. I. Bleasdale.

Applications of several parties for the office of Horticultural Officer were received and placed on file.

Mr. West presented the following resolution, which was unanimously adopted:

WHEREAS, This Board has been empowered by the Legislature to appoint a Horticultural Officer, and is authorized to declare quarantine rules and regulations for the preservation of fruit trees from insect pests:

Resolved, That before taking any definite action in relation to horticulture, there shall be organized under the auspices of this Board an Advisory Board of Horticulture, to consist of eleven members, to be selected and appointed as follows: Each District Commissioner shall nominate one member to represent the horticultural interests of his viticultural district, and each Commissioner for the State at large shall nominate one member for the State at large, and the Executive Committee of the State Horticultural Society shall be invited to nominate two members for the State at large. The members of said Advisory Board of Horticulture shall be selected among citizens of this State, especially qualified by practical experience and study in horticultural pursuits. The nominations shall be made to the President of this Board, who shall immediately notify the persons selected, and request them to convene in this city, at the office of this Board, on the fifth of April next, for the purpose of permanent organization and consultation. Said Advisory Board shall be requested to coöperate with this Board, and to make such recommendations relating to the horticultural interests of the State, and the appointment of a horticultural officer, as they may think proper. Said Advisory Board shall have the privilege of using the general meeting-room at the offices of this Board, where suitable accommodations shall be provided for their meetings, and the Secretary of this Board shall keep a record of their proceedings, and issue all notices of their regular and special meetings, which shall be held at their offices at such times as shall not conflict with the work of this Board, in accordance with the will of said Advisory Board: provided, however, that they shall not hold less than four regular quarterly meetings. In case of any vacancy in said Advisory Board, caused by the failure of the Executive Committee of the State Horticultural Society to nominate, within thirty days after being requested to do the same, such vacancy shall be filled by the vote of a majority of the members, nominated by members of this Board.

The Secretary was instructed to notify each member of the Viticultural Board and the State Horticultural Society of this action.

After consultation, and recognizing the importance of prompt action in this matter, the following names were nominated by district members of the Board present:

John Lewellyn, of St. Helena, nominated by Chas. Krug, for the Napa District.

William McPherson Hill, of Sonoma, by I. De Turk, for the Sonoma District.

Wm. B. West, of Stockton, by Geo. West, for the San Joaquin District.

M. T. Brewer, of Sacramento, by R. B. Blowers, for the Sacramento District.

J. P. Pierce, of Santa Clara, by Arpad Haraszthy, for the San Francisco District.

Felix Gillet, of Nevada City, by G. G. Blanchard, for the El Dorado District.

These nominations were unanimously approved by the Board. The name of W. B. West was presented by George West at the special request of the members present. There remains to be nominated one member by the Commissioner of the Los Angeles District, two by the Commissioners of the State at large, and two by the State Horticultural Society. It was the generally expressed wish of the meeting that the two to be nominated by Commissioners Rose and Shorb should especially represent, one citrus and the other olive culture.

This action was taken in order to create, semi-officially, a Horticultural Board similar in character to the Viticultural, and to insure the most efficient and intelligent action in horticultural matters, satisfactory to the horticulturists of the State. This advisory Board will be provided with officers and Secretary without any additional expense to the State.

A standing Committee on Horticulture was then created, to consist of Commissioners West, Blowers, and Shorb.

Commissioner Blanchard nominated for the office of Chief Executive Viticultural Officer (who is to act also as Health Officer of the Board), Commissioner Charles A. Wetmore. No other nomination was suggested, whereupon Mr. Wetmore was elected unanimously, declining to cast his own ballot. In accepting the office, he did so upon the condition that his resignation should be accepted if he found that in the execution of his duties his appointment was not generally satisfactory to the viticulturists of the State. The salary, limited by the Act of the Legislature to one hundred and fifty dollars per month, would be too small to enable him to abandon all private business, but he would restrict his private occupations so that he could devote as much time as possible to the work assigned to him, which requires him to superintend field experiments, with remedies for vine diseases; to establish and enforce, with the approval of the Board, quarantine rules and regulations; to personally visit and report upon all viticultural districts of the State; to superintend the publication of reports, and to prepare a series of text-books in all branches of viticulture. The limit of traveling expenses and salary would not be more than sufficient to defray actual traveling expenses, which would be necessarily greater than the amount provided for by law.

A committee, consisting of Commissioners Haraszthy, Krug, and De Turk, was appointed to prepare instructions for the government of Mr. Wetmore's new office.

Mr. Blowers suggested the necessity of keeping experts in the field for at least three months, to search for and ascertain during the coming Summer, the entire extent of infection of vineyards by the phylloxera.

Mr. Blanchard suggested that simple and practical instructions should be published, explaining how the pest may be perceived and recognized by any intelligent person.

The salary of the Executive Officer was fixed at one hundred and fifty dollars per month, the amount allowed by law.

The following resolution, offered by Commissioner Wetmore, was adopted :

*Resolved*, That the Committee on Conference with the Board of Regents of the State University be instructed to communicate to the Board of Regents the recommendations of this Board relating to the appointment of a State Entomologist, and to recommend that a Professor of Entomology be provided for at the State University; also to request that the viticultural work conducted at the University be continued.

The meeting then adjourned until eleven o'clock A. M., April sixth, at which time it is expected that the recommendations of the Advisory Board of Horticulture will be received and acted upon.

J. I. BLEASDALE,  
Secretary.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS, }  
SAN FRANCISCO, April 6, 1881.

The Board of State Viticultural Commissioners met in their new office, 111 Leidesdorff street, at eleven o'clock A. M., pursuant to adjournment.

Present: Charles A. Wetmore, Vice-President, presiding; Charles Krug, I. De Turk, R. B. Blowers, George West, L. J. Rose, G. G. Blanchard, and J. De Barth Shorb.

Absent: Commissioner Haraszthy.

In the absence of the Secretary, Mr. Shorb was elected pro tem.

The resignation of Dr. J. I. Bleasdale as Secretary of the Board was presented and accepted, and in his stead John H. Wheeler was unanimously elected.

On motion of Mr. Shorb, the reading of the minutes of the preceding meeting was dispensed with.

The report of the Executive Committee was presented by Mr. Wetmore and accepted by the Board.

The Conference Committee reported that they had communicated to the Board of Regents of the University the recommendation of this Board relating to the appointment of a State Entomologist and the continuance of viticultural work at the University.

On the recommendation of the Executive Committee, the rooms occupied at this meeting were chosen as rooms adapted to the business of the Board, and it was decided to continue in their occupancy.

The letters in reply to the letters of appointment on the Horticultural Board were presented and placed on file.

An interesting discussion here arose on brandy and its manufacture, on counterfeits and adulterations, coloring matter, etc.; after which, by unanimous vote of the Board, a committee of three was appointed by the Chair on Distillation, Counterfeits, and Adulterations.

Chief Viticultural Officer, Mr. Wetmore, reported that concerning his duties as said officer he had already begun extensive experimental work in disinfecting cuttings; that as disinfectants, Mindeleff's process had proved quite successful, and further, that he had tried sulphide of lime, copper sulphate, carbon bisulphide, and other disinfectants; that the copper sulphate seemed to act as a stimulant. All of his results would be ultimately stated to the Phylloxera Committee.

In relation to the additional printed reports of the Board of State Viticultural Commissioners to be done by the State Printer, it was stated that the printing of these reports was delayed in order to include the organization of the new Horticultural Board.

On motion of Mr. Blanchard, seconded by Mr. Shorb, the Board unanimously decided to denominate the new Board as The Board of State Horticultural Commissioners.

Mr. Ellwood Cooper, of the Horticultural Board, appeared as committee of one from the Horticultural Board to present for election and appointment as Chief Executive Horticultural Officer, the name of Matthew Cooke, of Sacramento, whom the Horticultural Board had nominated for said office. Whereupon, the name of Matthew Cooke was placed in nomination; being seconded and voted upon, he was unanimously elected and appointed as Chief Executive Horticultural Officer. The Secretary was instructed to notify Mr. Matthew Cooke of his election and appointment.

A communication from Dr. J. I. Bleasdale, soliciting the patronage of the Board in any organic analyses which they might require, was submitted, and in reply, the following was unanimously adopted:

*Resolved*, That the Board commend Dr. J. I. Bleasdale, late Secretary, for his zeal in the interest of viticulture in the State of California; that his communication in relation to an organic chemist for the Board be received and placed on file; that the said matter be referred to the Executive Board of this Commission.

Secretary instructed to transmit copy of resolution to Dr. J. I. Bleasdale.

An argument followed on the best means of eradicating the ravages of the vine hopper, resulting from which, the use of sulphur, mixed with a small amount of the red oxide of mercury was decided upon as a most favorable means of destroying the eggs—this method being used by Commissioner Blowers.

The following Committee on Distillation, Counterfeits, and Adulterations, before mentioned, was here appointed, viz.: Messrs. Shorb, Krug, and West.

On motion of Mr. Blanchard, seconded by Mr. Blowers, the salary of the Chief Horticultural Officer was fixed, according to law, at one hundred and fifty dollars (\$150) per month; his term of office to begin on April 11, 1881.

The Commission then adjourned.



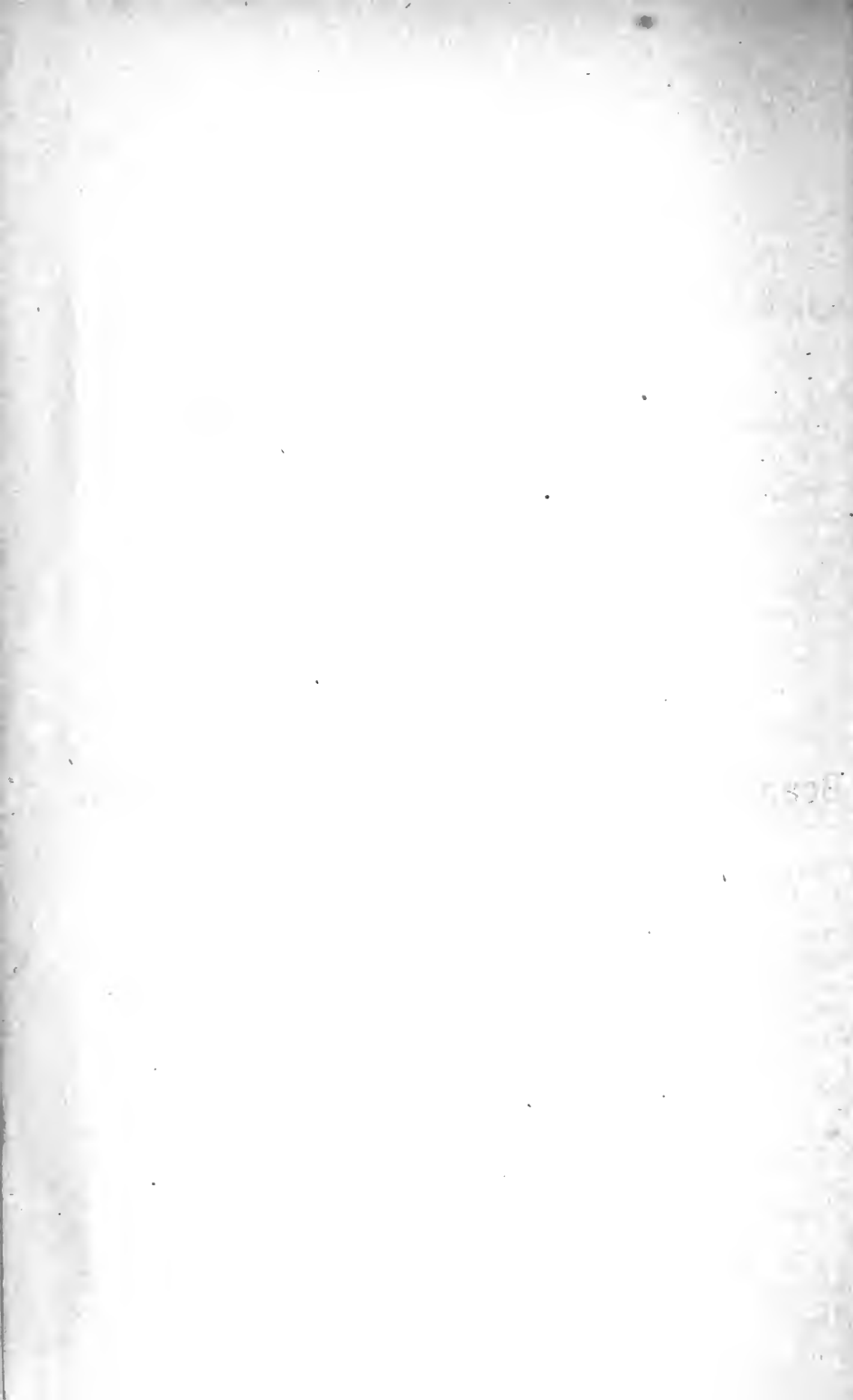
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SESSIONS

OF THE

**Board of State Horticultural Commissioners.**

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# SESSIONS OF THE BOARD.

## MINUTES OF THE PROCEEDINGS OF THE BOARD OF STATE HORTICULTURAL COMMISSIONERS.

OFFICE OF THE BOARD OF STATE HORTICULTURAL COMMISSIONERS, }  
111 Leidesdorff Street, San Francisco, April 5, 1881. }

This being the day appointed by the Board of State Viticultural Commissioners for the organization of an Advisory Board of Horticulture, the meeting was held at 111 Leidesdorff street, San Francisco.

The appointment of this Board was made to better facilitate the carrying out of Section 8 of "An Act to define and enlarge the duties and powers of the Board of State Viticultural Commissioners, etc.," approved March 4, 1881, which section reads as follows: .

SEC. 8. The Board of State Viticultural Commissioners shall also appoint an officer, who shall be especially qualified by practical experience in horticulture for the duties of his office, to perform similar duties respecting the protection of fruit and fruit trees as are provided for in this Act in reference to grapevines, with like powers: and the salary and traveling expenses of such officer shall be fixed by the said Board at the same amounts provided for in the case of the Chief Executive Viticultural Officer; and the said Board shall have power to establish such quarantine rules and regulations as are required for the protection of fruit and fruit trees from the spread of insect pests.

Pursuant to this section, the Viticultural Board, at their last meeting, held on March twelfth, adopted the following resolution:

*Resolved*, That before taking any definite action in relation to horticulture, there shall be organized, under the auspices of this Board, an Advisory Board of Horticulture, to consist of eleven members, to be selected and appointed as follows: Each District Commissioner shall nominate one member to represent the horticultural interests of his viticultural district, and each Commissioner for the State at large shall nominate one member for the State at large, and the Executive Committee of the State Horticultural Society shall be invited to nominate two members for the State at large. The members of said Advisory Board of Horticulture shall be selected among citizens of this State especially qualified, by practical experience and study, in horticultural pursuits. The nominations shall be made to the President of this Board, who shall immediately notify the persons selected, and request them to convene in this city, at the office of this Board, on the fifth of April next, for the purpose of permanent organization and consultation. Said Advisory Board shall be requested to cooperate with this Board, and to make such recommendations relating to the horticultural interests of the State, and the appointment of a horticultural officer, as they may think proper. Said Advisory Board shall have the privilege of using the general meeting room at the offices of this Board, when suitable accommodations shall be provided for their meetings, and the Secretary of this Board shall keep a record of their proceedings, and issue all notices of their regular and special meetings, which shall be held at their offices at such times as shall not conflict with the work of this Board, in accordance with the will of said Advisory Board; *provided, however*, that they shall not hold less than four regular quarterly meetings. In case of any vacancy in said Advisory Board, caused by the failure of the Executive Committee of the State Horticultural Society to nominate, within thirty days after being requested to do the same, such vacancy shall be filled by the vote of a majority of the members, nominated by members of this Board.

## NOMINATIONS.

The nominations made to the President of the Viticultural Commissioners consist of the following named :

A. Cadwell,\* Commissioner for the Sonoma District.  
 W. W. Smith,† Commissioner for the Napa District.  
 M. T. Brewer, Commissioner for the Sacramento District.  
 W. B. West, Commissioner for the San Joaquin District.  
 Felix Gillet, Commissioner for the El Dorado District.  
 Albert S. White, Commissioner for the Los Angeles District.  
 S. F. Chapin,‡ Commissioner for the San Francisco District.  
 Chas. H. Dwinelle, Commissioner for the State at large.  
 Matthew Cooke, Commissioner for the State at large.  
 Charles H. Shinn, Commissioner for the State at large.  
 Ellwood Cooper, Commissioner for the State at large.

These all accepted the nomination and were appointed by President Haraszthy, of the Viticultural Commission. At this meeting there were present all of the above named and appointed Commissioners except Mr. Felix Gillet, of El Dorado, Albert S. White, of Los Angeles, and A. Cadwell, of the Sonoma District, who were necessarily detained.

The meeting was called to order by Mr. Haraszthy, of the Board of State Viticultural Commissioners, at eleven o'clock A. M., there being present Messrs. DeTurk, Shorb, Rose, and Wetmore, of the Viticultural Board.

Mr. Haraszthy stated that the object of the meeting was for the organization of a Board to act independently of the Board of State Viticultural Commissioners, in the interest of horticulture; and, reading the resolution offered by Mr. West, of the Viticultural Commissioners, at their meeting held on March 12th, 1881, in which the purposes of the Horticultural Commission are more fully defined, stated, on behalf of the Viticultural Commissioners, that they would indorse all legal measures adopted by the Board now about to be formed.

Section five of "An Act to protect and promote the horticultural interests of the State," approved March 14, 1881, was read by the President, and other sections from the same Act referred to.

The meeting was then left to organize and proceed with its business of electing officers, etc. Charles H. Dwinelle, of Berkeley, was elected President, and John H. Wheeler, Secretary pro tem.

The order of business adopted by the Viticultural Board was decided upon as the regular order of business for this Board.

It was moved, seconded, and carried, that six constitute a quorum for meetings of the Board.

The Board then adjourned to one o'clock P. M. of the same day.

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At one o'clock P. M. the Board assembled, and entered upon the election of a nominee to the Viticultural Board for Chief Executive Horticultural Officer. Communications were received commending for the above nomination the names of Messrs. L. D. Morse, Matthew

\* *Vice* Wm. McPherson Hill, declined.

† *Vice* John Lewellyn, declined.

‡ *Vice* J. P. Pierce, declined.

Cooke (Commissioner), John Britton, Dr. S. F. Chapin (Commissioner), and J. L. Sanford. As a result, the following was the ballot:

Mr. Cooke, 6; Dr. Chapin, 1; whereupon Dr. Chapin withdrew his name, and rendered the election unanimous in favor of Mr. Cooke.

Mr. Cooper was appointed as a committee of one to present the name of Mr. Matthew Cooke, of Sacramento, to the Board of Viticulture, as the choice of the Horticultural Board for Chief Executive Horticultural Officer, and to recommend that he be elected and appointed as such.

The work of appointing committees was here entered upon, with the following results:

*On the Occurrence and Ravages of, and on the Remedies Against Insect Pests on Citrus Trees*—Albert S. White.

*On Olive Trees*—Ellwood Cooper.

*On Scale Insects of Deciduous and Ornamental Trees*—Dr. Chapin.

*On Codling Moth*—Messrs. Cooke and Gillet.

*On Red Spider, Mites, etc.*—Mr. West.

*On Fruit Packages*—Messrs. Smith and West.

*On Transportation and Quarantine*—Messrs. Shinn and Cooke.

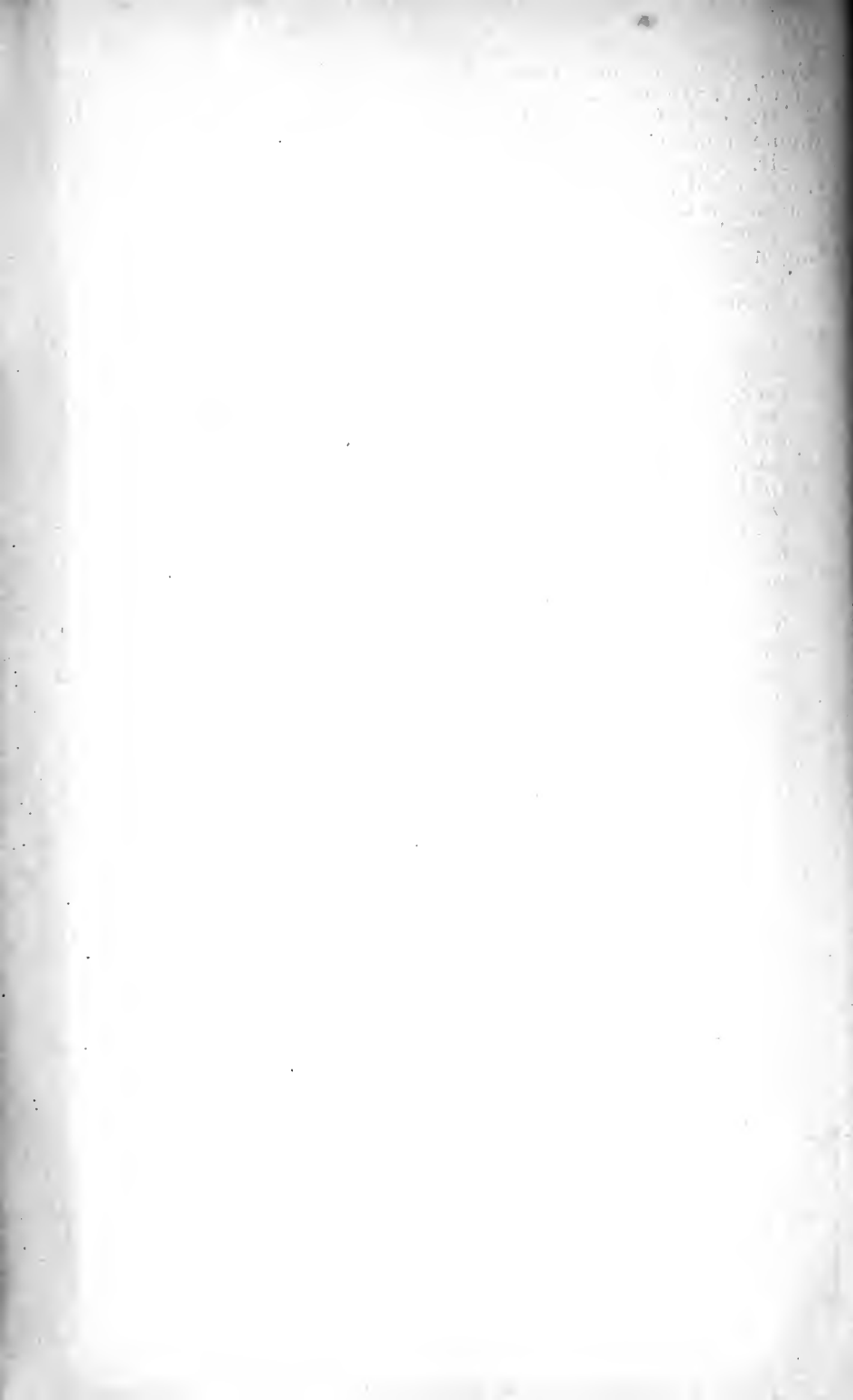
*On Rules and Regulations*—President Dwinelle.

*On Conference with Shippers and Commission Merchants*—Mr. Brewer.

*On Borers Injurious to Fruit and Fruit Trees*—Mr. Gillet.

It was decided that the regular quarterly meetings should be held on the last day of March, June, September, and December. All other meetings to be called by the President, and only at the request of six members of the Board.

JOHN H. WHEELER, Secretary.



NOTE.—This specimen shows in natural size a number of a graft of European Vitis (var. rotundifolia) on a section of wild California root, (var. from an old vine in Lake County, California in the Spring of 1884) with full development of graft and roots during first season. The specimen has been since was selected from the material of the experiment, (others attacked in same season a growth size field as given.

#### DESCRIPTION.

Development of growth of Vinifera Graft in first year of 1884.—1885.

Point of union with section of wild root.

Section of wild root (California) grafted upon.

Development of new roots during first season of grafting.—1885.

Continuation of new roots to show natural size.



#### PROPAGATION OF THE VINE.

FIG. 7. Vinifera Graft on Section of Wild California Root.



# PROPAGATION OF THE VINE.

1. The seed of the vine.
2. The seedling of the vine.
3. The seedling of the vine.
4. The seedling of the vine.
5. The seedling of the vine.
6. The seedling of the vine.



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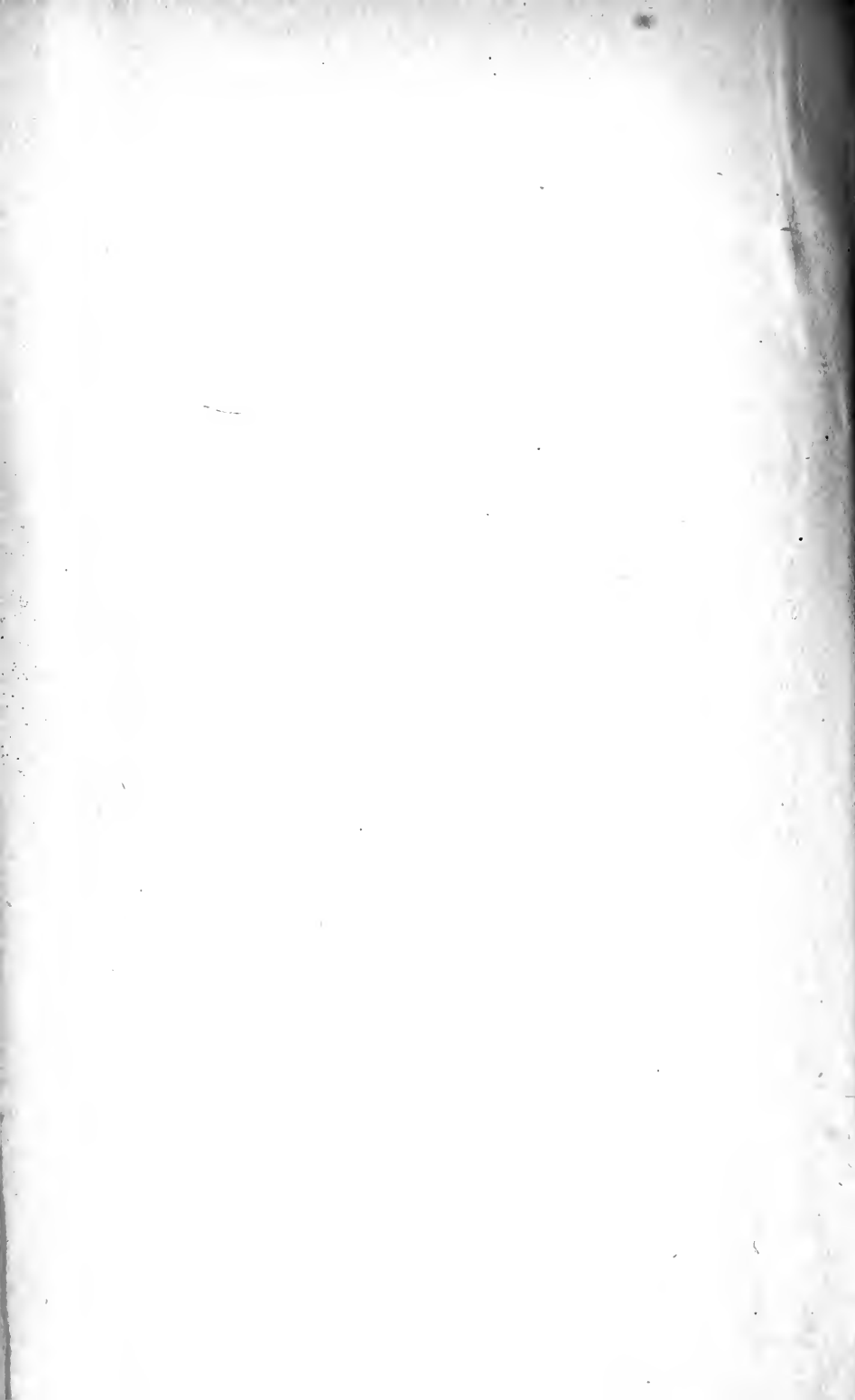
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## ADDENDA.

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NOTE.—The publication of a second edition of this first annual report, revised and amended, has afforded an opportunity to the Viticultural Commissioners to make public the changes that have been made in the constitution of the Board (including a statement of the organization of the Horticultural Board), in pursuance of the recent Act of the Legislature, approved March 4, 1881, and, in addition thereto, to publish the following supplementary papers.

SAN FRANCISCO, April 12, 1881.



# SUPPLEMENTARY REPORT.

BY MR. CHAS. A. WETMORE, CHIEF EXECUTIVE VITICULTURAL OFFICER  
AND COMMISSIONER FOR THE STATE AT LARGE.

SAN FRANCISCO, April 11, 1881.

To the Board of State Viticultural Commissioners:

GENTLEMEN: In my report of December 22, 1880, heretofore published, I had the honor to call your attention to certain studies of seedling vines, and especially to the importance of experiments now being made with the *vitis Californica*. The topics treated upon involved radical questions in viticulture; having this opportunity for further discussion, I shall first explain the accompanying plates, showing figures one to seven inclusive, illustrating

## THE PROPAGATION OF THE VINE.

The first six figures have been heretofore published by me, but are included here to preserve the continuity of these publications.

Figure 1. Seed of the *vitis Californica* enlarged six times in diameter.

Figure 2. Lithographic copy of a photograph of a seedling *Californica*, showing its development (nearly one half natural size) in six months and a half from the date of planting the seed. It is especially intended to show the superior development of root system of a vigorous seedling as compared with the ordinary lateral system of roots developed from cuttings, as well as the extreme vigor of growth of *Californica* seedlings. The seedling photographed was raised by Mr. C. Mottier, at Harbin's Springs, Lake County, California, in 1879, had attained, when taken from the ground, a height of three feet above the soil, a diameter of main stem three eighths of an inch, and pivotal root extension of three feet and a half, without accounting for the slender rootlets broken in removal from the ground. Many similar seedlings were produced in suitable soils in different parts of the State in 1880. The practicability of obtaining them in sufficient numbers and at reasonable cost for grafting purposes has been fully demonstrated. The fiber of the roots is tough, close, and indicates qualities of a phylloxera-proof stock.

Figure 3. Leaves, wood, and fruit of the *vitis Californica*, gathered at Harbin's Springs, in the wild state. Berry, black; skins containing much fine coloring matter. It is impossible to tell how much this fruit may be improved by proper culture. Notes upon wines produced from its juice were given in my report of December 22, 1880.

Figure 4. Development of a cutting (reduced size) two years old planted in usual manner, showing the peculiar lateral system of roots, easily compared with that of the seedling, (figure 2).

Figure 5. Bud cutting, or "single eye," intended to be planted beneath the soil. This method of propagation is frequently used in order to multiply plants, when cuttings are scarce.

Figure 6. Development of bud cutting ("single eye"), one year old, one sixth natural size, showing striking similarity of roots, as compared with seedlings.

The second plate, showing figure seven, is entirely new to the public. It is a fac simile, natural size, of the development of a European (*vitis Vinifera*) graft on a section of root cut from an old wild vine (*vitis Californica*), in one season (1880), operated by Mr. C. Motier, at Harbin's Springs. This subject was the smallest of all his experimental results, the majority of which had developed an extraordinarily vigorous growth, most of them attaining a new growth of the graft of from ten to fourteen feet in height. Ordinary good cuttings of the same varieties as the grafts in the same soil did not exceed three feet in height in the same time.

The strong tendency of the *Californica*, both seedling and grafted roots, to throw roots deep into the soil, is fairly demonstrated by these plates, and its value as a grafting stock is practically proved. Having already discussed this proposition, as fully as present information permits, in my previous report, I shall not enlarge upon it here.

In order to further test the practical value of the *vitis Californica* as a grafting stock for the *vitis Vinifera* (European varieties), I have this year grafted and planted in my nursery at Pleasanton, Alameda County, nearly one thousand seedlings (raised last year at the State University, Berkeley, by Professor Hilgard), and five thousand sections of wild roots after the manner illustrated in figure seven, using the English cleft graft method. Besides these, I have planted two thousand cuttings of the wild vine, in order to fully test the species by the different methods of propagation. I am so confident of success, that I have also sown a large field with seeds, not only of the *vitis Californica*, but also of the *vitis Riparia* (from Missouri), *vitis Aestivalis* (from North Carolina), *vitis Candicans* (from Texas), *Lenoir*, or *Jacquez* (from Texas), *vitis Arizonica* (from Arizona), and others in smaller lots, among which are the seeds of wild vines (*vitis Vinifera*), from Kashmir, procured by Mr. Drummond.

The interest in this subject has been greatly increased in this State since the favorable results obtained in raising seedlings from the seed distributed by me, for experimental purposes, one year ago. The vigorous growth of the yearling plants is attested everywhere. Grafts are being made upon those furnished from the nurseries of Professor Hilgard, at the State University, Mr. Charles Krug, at St. Helena, Mr. John L. Beard, at Centerville, and others.

Mr. J. P. Pierce, of St. Clara, has set out in vineyard ten acres with yearling seedlings for future grafting, and his son, R. T. Pierce, has started another nursery.

Mr. Joseph James Forrester writes, February 21, 1881, from Oporto, Portugal, that he has also had good success with these seeds (*vitis Californica*):

Those which came last year, he writes, arrived rather too late; still we made a plantation of some, and you will be pleased to hear that the plants showed considerable vigor, and threw out strong roots. I have this week transplanted from the nursery to our vineyard in the Douro (some eighty miles from this inland) a considerable number of plants, and I trust that in that soil so congenial to vines they may flourish. This year considerable plantations of seed will be made in the Douro itself, and the twenty pounds above referred to, in the hope to get in by March. In that district the heat is rather severe toward the month of June, and it is impor-

tant the seed should be put in early—say, not later than April. Last year we were only able to get it planted on the 26th of May; in consequence, a great number of the vines could not gain strength enough to stand the season. This year the experiment will be carried through thoroughly.

In the Douro we are still fighting the phylloxera, and have hopes that sulphide of carbon may do us some good.

In a vineyard belonging to us, and situated in the very finest district, fifty-five acres in extent, we got last year five pipes of wine, instead of sixty.

Our immediate neighbors are in the same plight, but a few miles off scarcely any damage has been done, though there are signs that the plague is now reaching them.

In addition to the *vitis Californica*, we are also experimenting with the Mustang from Mexico, and wild seed from one or two districts.

Mr. Forrester has forwarded to me also a collection of cuttings of seven leading varieties of vines most appreciated in the port wine districts of the Douro, viz.: *Bastardo*, *Tinto Amarella*, *Mourisco branco*, *Mourisco preto*, *Tinto Caõ*, *Touriga*, and *Moretto*. From these I expect to propagate a considerable number of vines this year, hoping they will be of substantial value to the State. I have also to acknowledge the receipt from him of several important Portuguese works on viticulture and phylloxera.

From Professor Foex, I have received the following letter, giving further interesting information:

[Translation.]

MINISTRY OF AGRICULTURE AND COMMERCE, NATIONAL SCHOOL OF AGRICULTURE  
OF MONTPELLIER; VITICULTURAL STATION,  
MONTPELLIER, January 29, 1881. }

DEAR SIR: I come to thank you for the seeds of the *vitis Californica* and *vitis Arizona*, which you have been so kind as to send to me. I will keep you informed of the results that I may obtain through them.

The *vitis Californicus*, which you sent me last year, grew very vigorously all Summer; their vegetation was only arrested at the end of September by mildew (*peronospora viticola*), which attacked them with an extraordinary violence, while it did not affect the wild *vitis Riparias*, sown by the side of them. This accident prevented them from ripening their wood well; I hope, nevertheless, that they will show a fine growth this year.

The planting of American vines continues very actively in these districts (the south of France) and maintains satisfactory results.

We prefer always, for direct production of fruit, the *Jacquez* (*vitis Aestivalis*) and for grafting stock, the wild *vitis Riparia*. I shall send you, next March, a "Practical Manual for the Reconstitution of Southern Vineyards," which I have in press now, and which gives a resume of all that relates to the reconstitution of vineyards, such as is being practiced here.

I take the liberty of sending to you, by this mail, some seeds of the *vitis Berlandieri*, an American species, very vigorous, from Texas, and which may, perhaps, be interesting to you in California; also, the catalogue of our collections of this year.

G. FOEX.

Professor Foex recommends the seedlings of wild vines (*vitis Riparia*) for grafting stocks, and says that when well developed the first year they may be grafted the following year, using the English cleft graft. I believe that he will soon be convinced also of the value of the *vitis Californica*, and will recommend that also equally with the *Riparia*.

My opinion is that seedlings for grafting purposes should be raised in light, alluvial, and sandy soils, where natural moisture may obviate the necessity and expense of irrigation, and where the fullest development of roots and wood may be obtained in the first season. Nurseries so established on a large scale may then provide the plants in great numbers, at small cost, much more economically and of greater value, as stocks, than plants raised in nursery at the vineyards, where, generally, the soil is not suitable for this purpose. My experiments this year with several acres sown in seed in the light, moist soil on the bank of the Arroyo Valle, at Pleasanton, may determine the practical merits of this method.

In gathering seeds for the propagation of grafting stocks, great care should be taken to avoid localities where the flowers of the wild vines may have been impregnated by the pollen of the European vines (*Vitis Vinifera*). The hybridization would impair the resisting powers of the wild stocks. The seeds of the *Vitis Californica*, with which I am experimenting, were all collected in Lake County, far from any vineyards, and will necessarily produce pure stocks.

#### NOMENCLATURE OF VINES.

It is important that the correct nomenclature of varieties of vines now cultivated in this State, should be ascertained as soon as possible. Great mistakes may be the result of further carelessness. For instance, it is not sufficient to name a vine *Chasselas*, *Pinot*, *Malvoisie*, *Muscat*, etc.; these names, and many others, denote families rather than varieties of vines. The synonyms of varieties should also be learned to avoid useless duplications. I would recommend that, during the ripening season, beginning this year, local exhibitions should be given for the comparison of the canes, leaves, and fruit of different varieties, where vine growers may attend and study and compare them carefully, and that a record be kept to designate the vineyards where the many varieties, some of which are now lost to name and fame, may be obtained for propagation.

The most important large collection of varieties imported into this State was that of Colonel Agoston Haraszthy, from which a large number of our vineyards received their stocks. I have obtained a copy of one of the original catalogues issued by Colonel Haraszthy, which, both for its value as an aid in determining nomenclature, and to preserve it as a part of the history of California viticulture, I reproduce, as an appendix to this report (Vide Appendix I). It is unfortunate that this fine collection was not carefully preserved and enlarged. A new and complete collection should be now commenced by the State, through the agency of the agricultural department of the State University.

#### THE WHITE YANTIC.

Mr. S. L. Rogers, attorney at law, of this city, has procured and presented to this Board cuttings of a wild vine which grew near the bank of the Yantic River, on the farm of the late Samuel Rogers, near Norwich, Connecticut, the fruit of which he remembers from boyhood as being of excellent quality. Only one other wild vine of this variety was known in that region, and for purposes of identification it is now called the White Yantic. I have taken care to provide for its propagation, to test its merits and to determine the family to which it belongs. It is described as a prolific bearer. Incidentally with these cuttings, were received roots of the sweet flag and winter-green, which will also be propagated.

#### THE PHYLLOXERA.

Since writing my last report I have further evidence of the danger of permitting the free introduction of rooted vines from Eastern States. I received in December last, from the Agricultural Department at Washington, through the kind attention of Hon. Horace Davis, a small collection of several varieties of rooted vines. These

I suspected, and, after keeping them in a box, in my office conservatory until the foliage started this Spring, I carefully examined the roots. As I had feared, the phylloxera was found working upon them. They were then thoroughly washed and disinfected by the use of powerful insecticides. The treatment has probably destroyed the vines; it was applied as an extreme test of endurance. I wish to urge our people to prevent by all means the importation of *rooted* vines, and to coöperate earnestly with this Board in securing as perfect disinfection of imported cuttings as possible.

Experiments are now being made with different insecticides to determine what treatments may be applied to cuttings and rooted vines without injury to their vitality. It is premature now to state results. It may be said, however, in advance, that soaking cuttings in a saturated solution of bluestone does not injure them, even when soaked for hours. Vegetation appears to be stimulated by the bluestone. The experiments conducted on a large scale at Nook Farm, by Captain Gustave Niebaum, will be watched with great interest.

The pest has made its appearance in all leading vine growing countries. Some particulars of the efforts being made to eradicate it in the Crimea, Russia, have been furnished to me, by Captain Gustave Niebaum, acting Consul of the empire of Russia, in this city, who has caused the accompanying translations from Russian reports (*vide* Appendix II), to be made for the use of this Board. He informs me also that detailed information and valuable documents from the Russian Department of Foreign Affairs, and seeds of indigenous wild vines, will be forwarded to us from time to time as opportunity offers.

#### HUNGARIAN BRANDY.

It is reported from London that the partial failure of the French brandy crop, owing to the ravages of the phylloxera in the Cognac region and the south of France, has stimulated Hungarian distillers to open a market for their products in England, where they are meeting with favor. It is probable that by the time our new plantations of vines materially increase our annual production of wine and brandy, there will be an active demand for our ports and brandy in England.

It is premature to estimate the acreage of new vineyards planted this year. The work is not yet completed, and reports from different districts are conflicting. I believe, however, that not less than twenty thousand acres have been planted. Some of the plantations are only small beginnings of great vineyards. One planter in Tulare County has begun this year by setting out two hundred and sixty acres, intending to increase them to one thousand next year. The colony system has been auspiciously inaugurated this year by the organization of the Italian-Swiss Agricultural Colony, which combines the principles of a savings bank with investment in and cultivation of vineyard lands. I commend the plan of this colony to others who are thinking of establishing coöperative associations. The promoters of the enterprise say that they were influenced to organize it by reading a copy of the first edition of the reports of this Board.

CHAS. A. WETMORE,

Chief Executive Viticultural Officer and Commissioner for the State  
at large.

## APPENDIX I.

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To the Supplementary Report of Charles A. Wetmore, Chief Executive Viticultural Officer, etc.,  
being a reproduced copy of an original catalogue of the vines, etc.,  
introduced in 1861 by Colonel Agostin Haraszthy.

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The following catalogue of vines and trees, imported from Europe in 1861 by the undersigned, who was traveling as Commissioner of the State of California, and who, in person, selected these vines and trees in the different vine-growing States, with great care and expense, and, after their safe arrival, planted them on his Sonoma plantation, in nursery, to acclimatize them, and thus make them fit for replantation in all parts of this State. They are well rooted, and will not fail to grow in almost any soil. The cuttings are carefully selected from such vines as made good wood of the lately imported ones, as well as from those which the undersigned had in former years imported, and had tested their fruits from one to three years, and guarantees the varieties to be what they purport to be. By perusing said catalogue, all can see at a glance that almost every variety now in the civilized world is to be got in this nursery.

Those kinds which are famous for generous wines are in large quantities—twenty thousand and thirty thousand of a species.

Persons making orders will do well to state to the undersigned whether they wish the vines for fruit or market, or for wine making; also, what soil they wish to plant on, so that he may suggest the best qualities for wine making.

Any information asked will be cheerfully given gratis. Persons possessing warm locations will do well to plant largely raisin grapes, because raisins will pay better than any wine. A choice of the Sultana and Malaga raisins can be procured here.

Wine growers must bear in mind that generous wines, with the desired bouquet, can only be made from proper foreign vines, and it costs no more to plant and cultivate one acre of foreign vines than of native, and the wine made from the former will sell for quadruple the price.

There are also for sale two hundred Italian chestnut trees of the largest sort known. This delicious fruit grows well in California. The trees offered for sale were imported from Italy, are well rooted, and it is believed the only ones in this State. There are also genuine French prunes, eight varieties; Italian and Spanish soft-shell almonds, lemons, oranges, olives, pomegranates, and walnuts, of enormous size, from Greece. From all the above varieties of trees some scions can be procured, if ordered in time.

Persons wishing to purchase vines, chestnut trees, or scions of prunes, olives, etc., can do so by forwarding their orders by mail to the undersigned.

The prices will be very moderate, so as to make it every vine grower's interest to purchase. The packing will be attended to with



great care. Packages will be sent by Wells, Fargo & Co.'s Express to any part of the State. When the order is made by letter, the persons ordering will be informed by the undersigned the amount of cost, which is expected to be sent by express before the package leaves the nursery.

The sooner the orders are made the better the vines will succeed, as early planting is more advantageous and surer than late. January should see all the vines in the ground.

A. HARASZTHY,  
Buena Vista Ranch, Sonoma.

## CATALOGUE

*Of Two Hundred Thousand Cuttings and Vines, of the below-named sundry varieties, imported from all the principal vine-growing countries.*

Those from France are marked with the letter F.; from Hungary, with H.; from Germany, G.; and those from the other countries the names are given in full.

1. Affenthaler, blue	G.	49. Calytor	F.
2. Alant, white	H.	50. Camareau, red	F.
3. Alexander, black	F.	51. Camareuze	F.
4. Alicante, rose	F.	52. Candol giant, red	F.
5. Alicante, black	F.	53. Carment, black	G.
6. Alicantino, white	Florence.	54. Cartnixa, rose	Spain.
7. Alicantino, black	H.	55. Chalianne	F.
8. Alkermes	Peru.	56. Champagne	F.
9. Almandi	F.	57. Champaner, white	G.
10. Amador	F.	58. Chasselas, croquant	H.
11. Amarot	F.	59. Chasselas, doré	F.
12. Anatolia, white	H.	60. Chasselas, de	Florence.
13. Angster, white	G.	61. Chasselas, rose (Jalabert)	F.
14. Angster, blue	G.	62. Chasselas, musqué rose	F.
15. Arbone	F.	63. Chasselas, musqué white	E.
16. Argenti	F.	64. Chasselas, Napoleon, white	F.
17. Assyri, white	H.	65. Chasselas, Pondichery	F.
18. Arramont, black	F.	66. Chasselas, Rose (Jalabert)	H.
19. Ayrine, white	F.	67. Chasselas, Fontainebleau	F.
20. Azilante, white	F.	68. Chasselas, Serine	F.
21. Bakator, white	H.	69. Chasselas, Royal, red	H.
22. Bakator, high red	H.	70. Chasselas, common red	F.
23. Bakator, dark red	H.	71. Chasselas, common rose	F.
24. Bakator, black	H.	72. Chasselas, violet	F.
25. Bakator, esutskos	H.	73. Clairette, white	G.
26. Bak-szem, blue	H.	74. Clairette, de Limoux, white	G.
27. Balafant, white	H.	75. Clairette, rose	G.
28. Balavry, white	F.	76. Claevner, red	H.
29. Balavry, black	F.	77. Crabarnette	F.
30. Bálint, white	H.	78. Császár szőlő	H.
31. Balouzot	F.	79. Cserbajor, white	H.
32. Barbarouse	F.	80. Cigandi, white	G.
33. Barbaroux, black	F.	81. Ciotat, white	H.
34. Basilicum, white	G.	82. Ciotat, black	H.
35. Bastardo, black	Portugal.	83. Crignane	F.
36. Belline	F.	84. Coumbou	F.
37. Beregi, rose	H.	85. Cony, black (very sweet)	F.
38. Bergamot scented	H.	86. Coustant	F.
39. Blusard	F.	87. Corbingay	F.
40. Bogdány Dinka	H.	88. Cornichon, violet, large	F.
41. Boros, white	H.	89. Cornichon, white	F.
42. Bourciano, white	Corsica.	90. Cornichon, white	H.
43. Bourdelais	H.	91. Corinthe, red	Crimea.
44. Bourgunder, black	G.	92. Corinthe, rose	F.
45. Bourgunder, white	G.	93. Corinthe, white	Crimea.
46. Bourgunder, early white	G.	94. Corteza nova	F.
47. Bourgunder, white	H.	95. Corteza black	Portugal.
48. Carbenet	F.	96. Courtanot	F.

97.	Croe	F.	167.	Grosse de roussanne	F.
98.	Cousiqueri noir, black	G.	168.	Grosse de Perle, white	F.
99.	Cruchinet, black	F.	169.	Grosse de Serine, white	F.
100.	Cruchinet, white	E.	170.	Gumier du Cantal, black	F.
101.	Cypertraube, blue	G.	171.	Gutedel early	G.
102.	Cyprusi szagos, blue, scented	H.	172.	Gutedel Kaiser, dark red	G.
103.	Dainascener, blue	G.	173.	Gutedel Kaiser, white	G.
	Dainascener, white	G.	174.	Gutedel Königs, dark red	G.
104.	Damaskusi, white	H.	175.	Gutedel Kracher, yellow	G.
105.	Damery	F.	176.	Gutedel Kracher, green	G.
106.	Dayne	F.	177.	Gutedel Kracher, red	G.
107.	Decandolle, white	H.	178.	Gutedel of Malay	G.
108.	Decandolle, rose, superb	F.	179.	Gutedel of Malvasier, lt. red	G.
109.	Decandolle, white	F.	180.	Gutedel Muscat	G.
110.	Defer	F.	181.	Gutedel of Paris, large green	G.
111.	Dinka, blue	H.	182.	Gutedel of Spain	G.
112.	Dinka, green	H.	183.	Gutedel of Hungary	G.
113.	Dinka, Posoni	H.	184.	Gyöngy syölö, white	H.
114.	Dinka, red	H.	185.	Hajnos, blue	H.
115.	Dinka, white	H.	186.	Hajnos, red	H.
116.	Dolcedo, very sweet, black, with red stalks	Illiria.	187.	Hajos	H.
117.	Dolcedo, very sweet, black, with green stalks	Illiria.	188.	Hajos, green	H.
118.	Doleetto	Italy.	189.	Halholyag, white	H.
119.	Donu	F.	190.	Hanvas, gray	H.
120.	Donunrelle	F.	191.	Hárslevelű, white	H.
121.	Doucemelle du Rhone	F.	192.	Harshlevel, white	G.
122.	Dure-preau	F.	193.	Heiney, blue	H.
123.	Duvesuve	Naples.	194.	Heimish, yellow	G.
124.	Egyptusi, white	H.	195.	Heptakilon, two crops	H.
125.	Elben, black	G.	196.	Hitzkirher, black	G.
126.	Elben, blue	G.	197.	Honigtraube, white	G.
127.	Elben, red	G.	198.	Hoszunyelű, white	H.
128.	Elben, white	G.	199.	Jacobs' traube, white	G.
129.	Elben, white	H.	200.	Jardovany, white	H.
130.	Eurage, black	F.	201.	Jardovany, black	H.
131.	Enrageat, black	F.	202.	Jean blank, white	Italy.
132.	Estrangey	F.	203.	Jouanne	Italy.
133.	Ezerjó	H.	204.	Junevoltel'anno, black	G.
134.	Farbtraube, black	G.	205.	Isabella, black	F.
135.	Feigen-traube	G.	206.	Isabella, blue	H.
136.	Fekete-sagos (scented), black	H.	207.	Isabella, white	H.
137.	Fiejuone	F.	208.	Isabella, nádor black	H.
138.	Folle noir, black	F.	209.	Isabella, red	H.
139.	Foldingier	F.	210.	Isabella, rose	H.
140.	Frankenthal, Autriche, black	F.	211.	Isagan	F.
141.	Froe-Labulaye, white	F.	212.	Iuhfark	H.
142.	Frontignan noir, black	F.	213.	Ischia, black	Naples.
143.	Frontignan blanc, white	F.	214.	Kadarka, black	H.
144.	Füger-kiss, white	H.	215.	Kadarka, blue	H.
145.	Füger-kiss, nagy., large	H.	216.	Kadarka, blue	G.
146.	Füger-kiss, white	H.	217.	Kadarka, white	H.
147.	Furment	G.	218.	Kadarka, olasy blue	H.
148.	Furmint	H.	219.	Kadarka, öreg	H.
149.	Furmint Madár Kás, white	H.	220.	Kadarka, Török	Turkey.
150.	Furmint Madár Kás, red	H.	221.	Kalabresca, Calabria	H.
151.	Furmint, white	G.	222.	Karholm, white	H.
152.	Fürmony	H.	223.	Kauka	Corinthia.
153.	Gansfussler, white	G.	224.	Ketskecsesű, red	H.
154.	Gaumier, white	G.	225.	Ketskecsesű, rose color	H.
155.	Gelbhölzer, black	G.	226.	Ketskecsesű, white	H.
156.	Genuai, white	H.	227.	Ketskecsesű, Korai rose	H.
157.	Gohér, black	H.	228.	Kéknélű, white	H.
158.	Gohér, blue	H.	229.	Kiralyedes, white	H.
159.	Gohér, Bajor, white	H.	230.	Kishmish, dark red	Smyrna.
160.	Gránát szagos (scented)	H.	231.	Klávner, white	G.
161.	Grecose	F.	232.	Koldussyölö, blue	H.
162.	Grignoli	F.	233.	Kölner, blue	Corinthia.
163.	Grinzingi, white	H.	234.	Kolner, blue	H.
164.	Gros pineau gris, gray	F.	235.	Kolontar, white	H.
165.	Grostorulier	F.	236.	Korinthe, white	G.
166.	Grosse de cahors	F.	237.	Korinthe, without seed	G.
			238.	Korintusi, small grapes	H.
			239.	Korintusi, large grapes	H.

240.	Kovatsy, white	..H.	312.	Muscat. Lunel	..H.
241.	Ködös, blue	..H.	313.	Muscat noir, black	..F.
242.	Kozma, white	..H.	314.	Muscat rouge, red	..F.
243.	Kozma, red	..H.	315.	Muscat picoli, blue	..H.
244.	Kövidinka, white	..H.	316.	Muscat de Urfay	..F.
245.	Laeryma Christi, blue	Spain.	317.	Muscatteller, black	..G.
246.	Lambert, white	..G.	318.	Muscatteller, blue	..G.
247.	Lambusquet	..F.	319.	Muscatteller, brown	..G.
248.	Lampartner, white	..H.	320.	Muscatteller, gray	..G.
249.	Lampre, white	..H.	321.	Muscatteller, cherry red	..G.
250.	Laska, blue	Corinthia.	322.	Muscatteller, light red	..G.
251.	Linberger, black	..G.	323.	Muscatteller, white	..G.
252.	Liverdon, black	..G.	324.	Muscat Tokay, white	..F.
253.	Liverdon, rose (Provence)	..F.	325.	Navarre	..F.
254.	Madeline	..F.	326.	Ochsenauge, black	..G.
255.	Madeline, black	..F.	327.	Oekörzem, white	..H.
256.	Madeline, white	..F.	328.	Olivette, rose	..F.
257.	Magdolona	..H.	329.	Orange traube, yellow	..G.
258.	Magdlentraube, white	..G.	330.	Orleans early sweet, red	..G.
259.	Magyarka, blue	..H.	331.	Orleans, white	..G.
260.	Majaritraube, blue	..G.	332.	Ortlcher, yellow	..G.
261.	Malaga Muscatelle	Malaga.	333.	Ortlcher, green	..G.
262.	Malaga földi, white	..H.	334.	Orleans, white	..H.
263.	Malaga Espagnol	Spain.	335.	Palestine	Palestina.
264.	Malingre precose, white	..G.	336.	Panpugent	..F.
265.	Malvoisé d' Aragon	..F.	337.	Panachécote	..F.
266.	Malvoisé Cartuscio	Spain.	338.	Passarel, black	..G.
267.	Malvoisé de Sitges	..F.	339.	Passatutti	Italy.
268.	Malbec	..F.	340.	Pedro Ximen	Italy.
269.	Malvoisie, early, white	..G.	341.	Perciona, white	Italy.
270.	Malvoisie, Hoffman's black	..G.	342.	Persiai, white, very large, imported from Persia to Germany.	
271.	Malvoisie, red	Italy.	343.	Persilade ciudad	Spain.
272.	Malvoisie rouge, red	..F.	344.	Petit Roussanne	..F.
273.	Malvoisie, white	..F.	345.	Petit Savognou	..F.
274.	Mancolo, serato	Italy.	346.	Picardou	..F.
275.	Marmet	..F.	347.	Pied d' Avuille	..F.
276.	Marocain noir, black	Morocco.	348.	Pied de Perdrix, black	..F.
277.	Morocain white	Morocco.	349.	Pique	..F.
278.	Martinoy	..F.	350.	Pihende, red	..H.
279.	Mataro	..F.	351.	Pingella, white	..H.
280.	Maton	..F.	352.	Pineau blanc, white	..G.
281.	Mauron	..F.	353.	Pineau doré, yellow	..F.
282.	Mears, black	..H.	354.	Pineau gris, gray	..F.
283.	Melon	..G.	355.	Pineau noir, black	..F.
284.	Melum	..F.	356.	Pinot de Vouray	..F.
285.	Menu Sirrac	..F.	357.	Pinot de Vouray rouge, red	..F.
286.	Merbregur	..F.	358.	Piquepoule gris, gray	..F.
287.	Merlet	Spain.	359.	Piquepoule noir, black	..F.
288.	Merlet, blue	..F.	360.	Piquepoule, rose	..F.
289.	Merlau	..F.	361.	Pizino, blue	..H.
290.	Mermezima	Italy.	362.	Plou Sarles	..F.
291.	Meunier	..F.	363.	Poerina noir, black	..F.
292.	Mézes, white	..H.	364.	Portugisi, blue (or Oporto)	..F.
293.	Mézes de Molmai, black	..H.	365.	Portugisi, blue (or Oporto)	..G.
294.	Miklos volgyi, red	..H.	366.	Prunelat, violet	..F.
295.	Mirkovatz	Smyrna.	367.	Prungerel	..F.
296.	Mockvoise, violet	..G.	368.	Pula, Palestina	Palestina, F.
297.	Molnártóke, blue	..H.	369.	Quadrat papsipka	..H.
298.	Morian de Paris	..F.	370.	Rafier, white	..H.
299.	Morillon, black	..H.	371.	Rajnai Ritzling, white	..H.
300.	Morillon, of double color, on one stem, white and black	..G.	372.	Rakszölö, green	..H.
301.	Morillon, panaché	..H.	373.	Ráushling, white	..G.
302.	Mounesty	..F.	374.	Recine de Suisse, white	Switzerland.
303.	Müller rebe, black	..G.	375.	Recine Morocco	..H.
304.	Muscat Alexandrine, white	..H.	376.	Refosco, blue	..H.
305.	Muscat	Algiers.	377.	Restrecinka, blue	..H.
306.	Muscat blanc, white	..F.	378.	Riesen traube, white	..H.
307.	Muscat brune	..H.	379.	Riesling, red	..G.
308.	Muscat, croquant	..H.	380.	Riesling, white	..G.
309.	Muscat folle	..F.	381.	Riesling, white	..H.
310.	Muscat, Frontignan	..H.	382.	Risabella, early	..H.
311.	Muscat gris, gray	..F.	383.	Rives altes, blue	..H.

384.	Rivolta, white	Bohemia.	457.	Urbanyi, red blue	Carinthea.
385.	Rochelle	F.	458.	Urban, black	Wurtemberg.
386.	Rokafarku, white	H.	459.	Urban, black	Wurtumburg.
387.	Ropogoszölö, white	H.	460.	Változo Góhé	H.
388.	Rosa de Trieste	Italy.	461.	Vaxillen traube, scented	G.
389.	Rosa de Revelietti	Italy.	462.	Velling, red	G.
390.	Rosen traube, rose	G.	463.	Verdale, green	F.
391.	Rothgipfler, green	G.	464.	Verdale, yellow	G.
392.	Rouget	F.	465.	Verdot fin	F.
393.	Römer, black	G.	466.	Verdot green	F.
394.	Rulander, gray	G.	467.	Verdure Savignone, green	F.
395.	Rulander, white	G.	468.	Vernagio	Tyrol.
396.	Rüzling Banati	H.	469.	Vernatch	Tyrol.
397.	Saint Antonio, black	G.	470.	Versetziféhér, white	Bánát, H.
398.	St. Laurent, black	G.	471.	Vicausa	F.
399.	San Giovetta	Piemont.	472.	Vidure	F.
400.	Sárfeher, white	H.	473.	Viertrágler	Bohemia.
401.	Sárféher piros, rose	H.	474.	Vignal	F.
402.	Sáfeher feketé, black	H.	475.	Vigney	F.
403.	Sauvignon, red	F.	476.	Vitessa	Piemont.
404.	Sauvignon, blanc, white	F.	477.	Volovna	H.
405.	Schoone	F.	478.	Woislauber, black	G.
406.	Sciacarello	Italy.	479.	Wachtelei, white	G.
407.	Secrafler, rose	H.	480.	Wessenbürgner	F.
408.	Seidentraube, white	G.	481.	Wildbacher	Carinthia.
409.	Seidentraube, green	G.	482.	Zante blanc, white	F.
410.	Semilon, red	F.	483.	Zante noir, black	F.
411.	Semilon, white	F.	484.	Zeller levelü	H.
412.	Siclers-rosine, blue	G.	485.	Zierfandler, red	G.
413.	Sirac noir, early black	G.	486.	Zöldszölö, green	H.
414.	Silvaner, black	G.	487.	Zultanszölö, white	H.
415.	Silvaner, green	G.	RECENTLY GENERATED FROM THE SEED.—EXCEL- LENT VARIETIES.		
416.	Silvaner, red	G.			
417.	Szilványi, green	H.	488.	A'tsai, white	H.
418.	Szilványi, red	H.	489.	Aranytöke, white	H.
419.	Smyrna, scented	Smyrna.	490.	Chalosse, white	F.
420.	Somsylölö, blue	H.	491.	Muscat traube	G.
421.	Somsylölö, white	H.	492.	Black Hamburg—any quantity of cut- tings, very reasonable.	
422.	Sovadevil, blanc, white	F.	Besides, from the native California grape, any quantity of cuttings, for fair prices.		
423.	Spaniol Malosa	Spain.	Fruit Trees.		
424.	Spaniol Malosa, white	Spain.			
425.	Spara monie	Italy.	1.	Almonds, soft shells—Italian and Spanish.	
426.	St. Antoine	F.	2.	Chirimogas—Malga.	
427.	Szeredi, rose	H.	3.	Chestnuts—Italian, of monstrous size.	
428.	Szeremi, green	H.	4.	Cupresses—Malaga.	
429.	Szintanyi, rose	H.	5.	Figs—Italy and Malaga.	
430.	Swisse	F.	6.	Granat apples—Malaga pomegranate.	
431.	Swisse blanc, white	Switzerland.	7.	Lemons—Italy and Malaga.	
432.	Taubenschwarz, black	G.	8.	Oranges—Italy and Malaga.	
433.	Tautovina, white	Carinthia.	9.	Olives—Italy and Malaga.	
434.	Teinturier, dark red	F.	10.	Pepper trees—Malaga.	
435.	Tamprano	F.	French Fruit Trees.		
436.	Teinturier	F.			
437.	Terre promise	F.	1.	Amandiers, coque, tendre.	
438.	Tihanyi fehér, white	H.	2.	Chataigniers.	
439.	Todor fehér, white	H.	3.	Figuers, varies.	
440.	Tokay blanc, white	F.	4.	Luger Stracernia.	
441.	Tokaifehér, white	H.	5.	Magnolia, grandiflora.	
442.	Tökösféhér, white	H.	6.	Muriers, blanc.	
443.	Tökösféhér, piros, rose	H.	7.	Muriers, Turin.	
444.	Tökösféhér, Zöld, green	H.	8.	Nogers, tendre.	
445.	Török Malozsla	Turkey.	9.	Olivers d'Europe.	
446.	Traminer gewürzt, (scented), white	G.	10.	Prunion, Dame Aubert.	
447.	Traminer gewürzt, red	G.	11.	Prunion, Imperatrice, violet.	
448.	Traminer gewürzt, white	G.	12.	Prunion, Monsieur June.	
449.	Traminer vörös, red	H.	13.	Prunion, Reine Claude.	
450.	Traminer vörös, white	H.	14.	Prunion, Reine Claude, Diophane.	
451.	Trollinger, black	G.	15.	Prunion, Reine Claude, verri.	
452.	Truinion	F.	16.	Prunion, Robe Sergeant.	
453.	Tulipiros, red	H.	17.	Prunion, Washington.	
454.	Tüske pupo, long	H.			
455.	Ubas de Laja	Malaga.			
456.	Ulrade	F.			

## APPENDIX II.

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To the Supplementary Report of Charles A. Wetmore, Chief Executive Viticultural Officer, etc.  
 Being reports of proceedings of Phylloxera Committee of the South Crimea, Russia,  
 translated, prepared, and communicated to this Board by Gustave Niebaum, Esq.,  
 Acting Consul of the Empire of Russia, San Francisco.

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At a meeting of the Phylloxera Committee, on the eighteenth of January, 1881, at Yalta, South Crimea, after prolonged and most detailed discussions as to how to combat the evil which threatens not only the Crimea, but the entire south of Russia and the Caucasus, it was determined, as a general principle, not to attempt to cure the affected vineyards, but to proceed at once to eradicate the phylloxera by employing sulphuretted carbonic acid gas. The following resolutions were then taken: (1) To dig up the infected vineyards; (2) to burn the vines and roots; (3) to change the treatment of vines with Boiteau's ointment and their periodical pruning; (4) to defer the burning of clippings till the month of May; (5) during the months of May and June, to examine, most strictly, all the vineyards of Crimea—the inspection taking place under the supervision of an expert, specially for that purpose, invited from Geneva; (6) to petition that the import into all southern ports of all sorts of grapevines and peach trees be prohibited; and (7), to establish, in the northern portion of the Crimean peninsula, a nursery of American grapevines which are phylloxera proof.

At Gesseli, the entire locality infected with phylloxera has been isolated by the establishment of a military cordon. Three hundred and fifty soldiers are now working on the vineyards of that locality, and three hundred and fifty more are expected in a few days. The work is progressing satisfactorily.

As soon as the phylloxera appeared in Crimea a series of energetic measures was immediately inaugurated to combat the evil on the very spot, and moreover, Mr. Danilevsky was sent abroad in order to investigate what means were being practiced in foreign lands; to have personal interviews with the inventors of the various methods; to purchase the necessary materials; in fine, to learn the latest words of science as to the manner in which the ruinous curse may be most successfully stamped out.

The result of Mr. Danilevsky's voyage answered, most fully, the expectations of Baron Korf, Aid-de-Camp to his Majesty, who had first proposed the expediency of such a trip. All measures which were hitherto in operation were suspended, and the Phylloxera Committee was called into session on the eighteenth of January, to decide upon matters of "special importance." Yesterday at midday the session took place. The President opened the meeting by giving to the members a brief account of his travels in the south of France and in Switzerland. The voyage was fraught with good results, for it delivered us from the necessity of buying two hundred and ten thousand pouds (twenty-six pounds to the poud) of unslacked lime, at a cost of some one hundred and thirty thousand roubles, and made it possible to purchase in its stead only three thousand pouds of sulphuretted carbon, costing about twenty thousand roubles—an article which has been finally recognized as the most efficient means, both

for curing diseased vineyards, and also for the radical destruction of the phylloxera.

Vine growers abroad are divided into two factions: one upholds the opinion that it is sufficient to cure the infected vineyards, demonstrating that even with the existence of the phylloxera, good harvests may be obtained; the votaries of the other faction insist upon the radical destruction of the pest. Circumstances generally settle the dispute as to the advisability of one or the other opinion. The first is, per force, adopted there where the infected vineyards occupy broad tracts of land, as in southern France; the adoption of the second opinion is risked in places where the pest is as yet confined to a small space, as in Switzerland.

The total area of the vineyards of the South Crimean Littoral, infected with the phylloxera, according to the latest investigations, covers a space of fourteen desiatines (about forty-two acres). To eradicate the phylloxera on that space, would mean not only to flood the vines with a strong solution of sulphuretted carbon (a weaker solution is used when cure of the infection is proposed), but to dig up all the stumps (a desiatine contains about nine thousand five hundred plants); to clear the ground of all roots, and finally to burn all, roots and vines. Our Phylloxera Committee thus had a question of momentous importance to solve, for its resolution was to direct the future direction of the work.

Taking into consideration that an examination of the vineyards situated up to the valley of Limen, and further towards Yalta, and those of the Theodosia and Kertch districts, gave no positive proofs of the existence among them of phylloxera; considering, also, that up to the month of May, the soldiers detailed for the purpose would be fully competent to dig up ditches through the entire infected locality, the committee resolved not to palliate the evil by attempting the cure of infected vineyards, but to proceed to a radical destruction of the phylloxera. Passing by the very animated debates that arose in the session, I will simply state the answers adopted, in reply to the questions laid before the members:

Question one—Is sulphuretted carbon to be adopted as a means to destroy the phylloxera, and does there exist any other more efficient method? Answer—Be it resolved to adopt sulphuretted carbon.

Question two—Is sulphuretted carbon to be employed as a means only to cure the infected vineyards, or to radically destroy the phylloxera? Answer—Sulphuretted carbon is to be used for radical destruction of the phylloxera. Moreover, steps must be taken to plant American vines, which are not subject to root-phylloxera, and which should be ready to be distributed in the country, in case the destruction of phylloxera should, through some cause, prove unsuccessful.

Question three—In what manner is the phylloxera to be destroyed by means of the sulphuretted carbon? Answer—Having first of all poisoned the plants (bushes) with strong doses of sulphuretted carbon, dig ditches over the whole vineyard consigned to destruction. At the bottom of the ditches, all roots found there going deeper into the soil must be again treated to doses of sulphuretted carbon. In digging the ditches, care must be taken to gather up all roots and to burn them, as also all the sticks to which the vines had been fastened. On termination of the ditching, the soil dug up must be allowed to settle as much as possible, and then its surface also must be poisoned with sulphuretted carbon.

Question four—What measures of those adopted in former sessions are to be discontinued or modified? Answer—(a) The annointing with Boiteau's mixture is hereby suspended; (b) No term for pruning is specified; (c) The clippings are to be burnt, not by the first of March, but by the first of May.

Question five—What is to be done with wild vines? Answer—Wild vines must be destroyed, together with their roots; the ground they grew upon dug up in ditches, and sprinkled with unslacked lime, to such a distance from the infected vineyards as would reach beyond the limits of infection by means of roots. The rest of the wild vines must be cut down, their roots pulled out, and the dug up ground around them sprinkled with unslacked lime.

Question six—How must the inspection of vineyards now supposed to be free from infection be organized? Answer—The Winter inspection, as giving no positive results, is to be discontinued, and inspection to commence from May, and to be finished by the first of July, for all Crimean vineyards. For this purpose parties of inspectors are to be formed under the general supervision of the experienced expert, Mr. Jäger, invited from Geneva; these parties are to make the inspections, and to be moreover controlled in all their actions by circuit inspectors. All questions, whether vineyards are infected or not, are to be decided by special experts. Circuit inspectors to be invited to Gesseli, and there made acquainted with the symptoms of infection and the manner in which phylloxera are to be found out.

Question seven—Is export of fruits and grapes from Crimea to be permitted? Answer—The export of fruits is to be permitted without limitation; grapes from infected localities and from circuits numbers one and two can be exported only to the interior of Russia, north of Chorsoff; from all other localities of the Crimea, export is without any restriction.

Question eight—Considering that many persons have expressed the conviction that a general prohibition of the import of foreign fruit would seriously impede commerce, would not the committee see fit to suspend the decision it had taken upon the subject and spread upon the minutes of its session of December 8, 1880 (section six)? Answer—The committee find necessary not only to prohibit, in accordance with the sanctioned (by his Majesty) opinion of the Committee of Ministers, the transfer of vine cuttings from one estate to another, but besides, to temporarily prohibit the import from abroad of all plants and fruits, not only into Crimean ports, but also into all the ports of the Black and Azoff Seas, and across the frontier south of Volochisk." The answer was finally amended thus: "Import of all fruit is allowed, except grapes and peaches, but the imported fruit must not be wrapped in grape leaves."

Question nine—What is to be resolved concerning the planting of American vines? Answer—The planting of American vines to be deferred till the Spring of 1882; in the meantime a place must be sought out for the plantation, distant from the existing vineyards.

During the debates it was determined that, until the requisite sulphuretted carbon could be received from abroad, sulphuretted carbonate of calcium and the fifty thousand pounds of unslacked lime be temporarily used. The northern portion of the Crimean peninsula was indicated as a most fit place to establish a nursery of American vines, of which ten thousand slips are to be ordered as a first experiment.

The session of the Imperial Russian Horticultural Society, of January twenty-fourth, was unusually well attended. The assembly had to discuss a question of the utmost importance, proposed by the Minister of Public Domains, as to what measures were to be taken to prevent the spread of the *Phylloxera Vastatrix*, that new scourge of Russian horticulture. A committee had been appointed to consider the measures proposed by the Ministry, and had come to the following conclusions:

1. It is desirable to prohibit the import, from foreign countries, of grapevines, and all plants in general, proceeding from localities where the grapevine is cultivated, and to grant free entry to plants coming only from such localities where the grapevine is not raised.

2. The import from foreign countries of vegetables and fruits to remain unrestricted, but subjected to the condition that the fruits be wrapped in paper, and not in leaves, as is done now.

3. Import of fruit and plants from Crimea to be entirely forbidden.

4. The establishment of quarantines is considered impossible.

Besides this general report Messrs. Maximovich, Regel, and others presented separate opinions.

Mr. Maximovich strives to demonstrate that any vigorous measures would be superfluous. The phylloxera, as is well known, after having reached its winged state of development, is easily transported by the winds to great distances. That in the black-loam provinces of Russia, where the grapevine is not cultivated, the phylloxera could not exist at all; that, as a whole, the repressive measures proposed by the Ministry could never produce the desired results, but would only unnecessarily impede commerce.

This opinion was received by the assembly with the greatest sympathy.

Professor Bataline endeavored to prove the necessity of preventive measures, adducing in support of his statement, the universal opinion of those most interested in the affair, namely, the horticulturists of Crimea, who had, collectively, petitioned the Ministry to adopt the most rigorous measures to stop the spread of the phylloxera.

Mr. Liapounoff (a resident of the Crimea), explained that the horticulturists of Crimea had, indeed, addressed such a petition, but that this occurred during the scare caused by the first appearance of phylloxera, and, that now the panic had subsided, and they (the horticulturists), were ready to accept less harsh measures. That it was proposed to divide all vineyards infested by the phylloxera into two portions; the first of which to destroy immediately, and the other in the beginning of Spring; that, moreover, it was considered prudent to prohibit the import of grapevines from foreign lands, and the import, into Northern Russia, of all fruits and plants from the southern provinces. Mr. Liapounoff concluded his remarks by stating, that, to combat the phylloxera, at the present stage of the evil, had become a most arduous undertaking, for the insect had already been met with upon wild vines in the forests, and that, moreover, the prevailing southerly winds continue to widen the affected circuits by transporting the phylloxera, when it had reached its winged state.

In view of the importance of the question, the assembly found it impossible to decide, at that sitting, for or against the proposed measures, and resolved to return the question back to the committee, with the request to investigate the matter further by inviting to its deliberations other competent persons, and then to present a fresh report as soon as possible.









